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Instructive Strike on a State Railway

Some months ago a bad strike took place on the government railways of South Africa. The government suppressed it by armed force. In doing so it was supported by public opinion. Only now has the *Railway Age Gazette* been able to get an article presenting somewhat fully the facts about this strike. It is considered worth while to publish it even at this late day, because it may have a lesson for the people of this country, and especially for railway officers and employees. The advocates of government ownership of railways persistently represent this policy as a remedy for strikes. The strike in South Africa was but one of numerous examples which state railways have afforded that public ownership is not a preventive of strikes. It also furnishes an example of the way in which labor unions and strikes are likely to be dealt with on government railways. The railway employees who read the story are hardly likely to find in it an argument from their standpoint in favor of state ownership. It illustrates the facts, as other incidents of a similar character have illustrated them, first, that public ownership is not a preventive of strikes, and, second, that when strikes do come on state railways they are much more likely to be short-lived than on private railways because public sentiment and the government are almost certain to take a determined stand against the strikers.

Abuse of the Parcel Post

As an incident of the European war, and the upheaval in the American money market, fifty-seven tons of gold was sent by parcel post from the Mint in Philadelphia to the Sub-treasury in New York. This trick of the government to get railroad transportation for nothing is not new, for ten carloads of gold were sent by registered mail, several years ago, from San Francisco to New York. A railroad president who was accused of padding the mails, during the weighing period, on his small road in Iowa, a few years ago, was indicted in court as a criminal and, we believe was punished; but it is difficult to see any great difference between his act and this one of the government. Sending big bags of gold by parcel post is legal, apparently; and so was the sending of tons of grain last year in Colorado, and of fruit in New Mexico; but everybody must admit that it is glaringly illegitimate. A postmaster in West Virginia has gone these fellows one better; it is related that he sent four barrels of flour by parcel post and thereby raised his office from fourth class to third, and secured an increase in his annual salary! These incidents, small in themselves, all combine to reinforce the demand that Congress take hold of the mail-pay question and settle it on a rational basis. The petty policies of the postoffice department are highly discreditable.

Varied Parcel-Post Philanthropies

Though Uncle Sam is by no means generous in his payments to the railways for handling the mails and the parcels, he is far from stingy with some of the contractors who operate star routes. This is strikingly illustrated by an incident of which the *Railway Age Gazette* has just learned the details. A certain contractor has the mail star route between Holbrook and Snowflake, Ariz. Recently this representative of the government bought 10,000 lb. of barley at Mesa, Ariz., on the Arizona Eastern, and shipped it by parcel post via Holbrook to Snowflake. The barley cost him 95 cents per 100 lb. at Mesa. The postage on it from Mesa to Snowflake was $1.08 per 100 lb. Therefore, laid down at Snowflake the barley cost him $2.03 per 100 lb. For transporting the barley via parcel post from Holbrook to Snokflake the contractor received from Uncle Sam $2.25 per 100 lb., or 22 cents per 100 lb. more than the cost of the barley plus the postage on it to Snowflake. In other words, in effect Uncle Sam

made this enterprising mail contractor a present of the barley and also of the transportation of it and, in addition, gave him 22 cents for accepting his Uncle's beneficence. His 10,000 lb. of barley laid down at Snowflake cost him just $22 less than nothing. The person who furnished the foregoing information added, "This fellow seems to have a good business head on him and no doubt will go into the business of retailing barley at Snowflake quite heavily. He is said to be figuring also on shipping baled hay in 50-lb. packages by parcel post." The distance by rail, Mesa to Holbrook is 340 miles; Holbrook to Snowflake, 30 miles. Which means that the contractor gets 22 cents per 100 lb. more than the cost of the barley, plus the postage on it, for hauling it 30 miles out of a total haul of 370 miles, the railway furnishing the other 340 miles of the transportation! We concur in the opinion that "this fellow seems to have a good business head on him." But how about the heads of the statesmen and postoffice department officers who have made this extraordinary transaction possible? Meantime, government officers will continue to send out from Washington long lectures on the inefficient and wasteful way in which the railways of the United States are managed!

German Criticism of State Railroads

Nowhere else has nationalization of railways been so extensively adopted as in Germany. Nowhere else, as is conceded by both the advocates and opponents of government ownership, has the management of state railways been so efficient. But even in Germany satisfaction with the results of government ownership is far from unanimous. A recent letter from a Berlin correspondent to the Springfield (Mass.) *Republican*, which we publish elsewhere, reviews numerous serious complaints which are being made in Germany against the state railways, and especially against the best of them, those of Prussia-Hesse. It is being charged that the Prussian railways have too many officers and employees, that their freight rates are kept too high in order to yield large sums to the public treasury; that rates are so adjusted as unfairly to discriminate between different classes of business concerns; and that government ownership has not remedied or prevented but aggravated the evils of monopoly, because the state railroads constitute a monopoly more powerful and arbitrary than any practicable combination of private corporations. A great evil on the German state railways, to which this correspondent does not refer, is the chronic and severe shortage of cars in seasons of heavy traffic movement. The criticisms of their railways being made by German economists and business men may not all be justified, but they refute the statement so often made by advocates of government ownership in this country that the results of nationalization in Germany give the "greatest satisfaction."

THE PRACTICAL MINIMUM GRADE

THEORETICALLY, the point at which an increase in expenditure to secure a lower grade, and thereby a reduced cost of transportation, ceases to be justified because of a disproportionate increase in fixed charges, is capable of accurate determination. Practically, the assumptions which must be made regarding the amount of traffic and other primary considerations are so largely a matter of judgment that the opinions of different railroad men vary widely. At no period in our railway development has this subject received so much attention, or have such large expenditures been made to secure low grades, as during the past few years. It is therefore highly important that the elements of uncertainty be reduced to the minimum. Many men seriously question whether some of the heavy expenditures now being made are justified, in view of the traffic to be handled now or to be reasonably expected in the future, and whether the fixed charges are not being increased unwisely to secure a low transportation cost.

This question was brought up in the recent investigation of and report on the construction of the National Transcontinental Railway by the government in Canada. On this line ruling grades of 0.4 per cent. eastbound and 0.6 per cent. westbound were adopted, resulting in heavy expenditures for construction, although it will undoubtedly be many years before the freight traffic will amount to over two or three trainloads each way daily. The increased expenditures necessary to secure these low grades through a country now largely a wilderness have been severely criticized. Other conspicuous examples of low grade lines constructed at heavy cost in recent years are the Spokane, Portland & Seattle, from Spokane to Portland; the Virginian and the Carolina, Clinchfield & Ohio, from the coal fields in West Virginia to the Atlantic seaboard; and the new line of the Erie between Meadville, Pa., and Corry, where the adoption of a 0.2 per cent. grade made necessary very heavy work. An instructive contrast in the ideas of different railroad men on this subject is afforded by the construction of the Spokane, Portland & Seattle and the new line of the Oregon-Washington Railroad & Navigation Company, between Spokane and the Columbia river, which is now being completed. The latter line is built generally parallel to the Spokane, Portland & Seattle, with a ruling grade of 0.6 per cent., as compared with a 0.4 per cent. grade on the North Bank road.

The advocates of these low-grade lines point to the low resulting transportation cost as a justification of their policy. On the Carolina, Clinchfield & Ohio, for instance, the transportation ratio for the fiscal year ending June 30, 1913, was only 17 per cent. It is not necessary to emphasize the importance of a low transportation ratio to the successful operation of a railway, or the fact that this becomes increasingly important as the amount of traffic increases. It is, therefore, generally recognized that it is entirely proper and advisable to anticipate the probable increases in traffic which may reasonably be expected within the next few years when planning on any improvements. It is also recognized that it is more expensive to reduce grades under traffic than when originally constructing a line.

On the other hand, it requires a heavy traffic to enable the reduced transportation cost to offset the heavy fixed charges on many of these low-grade lines, and it is difficult to determine how some of them, with two or three trains daily, vindicate the expenditures made. For example, the North Bank road, which was one of the early low-grade lines constructed through a heavy country, has failed to earn its fixed charges for the last three years, although it has now been in operation over six years. A careful estimate made previous to the authorization of a very expensive piece of grade reduction recently on a line handling a dense traffic, showed that even with this heavy traffic the improvement could be justified only in the light of the increased traffic expected a considerable time in the future.

The mere fact that a low-grade line earns a fair return on a large investment is not necessarily a vindication of the expenditure, for it is conceivable that the operation of more trains on a line constructed with heavier grades and at a reduced cost, would result in even greater profits in excess of interest charges. Another influence which must be considered at the present time is that of electrification. The electric operation of freight lines, especially on heavy grades, has not been developed far enough in this country to enable one to determine definitely what this method of operation will accomplish. But electrification must be considered as a possible alternative to low-grades in the near future. While transportation costs can be reduced by the reduction of grades at any time, the fixed charges are permanent.

It is not the intention here to criticize low-grade lines in themselves, but to raise for serious consideration the question whether grades are not sometimes being reduced below the economical limit for handling either the present traffic or that which may be expected in the near future. No one will deny the economy of a low-grade line, or will question the advisability of securing low grades, where this can be done at a reasonable expenditure. But it would seem that the advisability of the heavy expenditures which are being made on some lines are open to question.

AN EMERGENCY ADVANCE IN FREIGHT RATES?

A MOVEMENT has been started by J. S. Bache & Co., members of the New York Stock Exchange, for an immediate and substantial advance in freight rates as a means of dealing with the emergency confronting the American railway industry as a result of the war in Europe. We publish elsewhere a letter which this firm has sent to 32,000 bankers throughout the United States, urging them to petition Congress to pass a resolution requesting the Interstate Commerce Commission to revise its recent decision in the eastern rate advance case and to promptly grant further and adequate advances in rates to all the railroads.

It is impossible accurately to appraise the position in which the war has put the railways and other business concerns of this country, or to foresee what future developments in respect to them will be. There are, however, certain salient facts regarding the railway industry which should be given careful consideration by the public, by Congress and by the commission.

The people of Europe have invested large sums in the securities of American business concerns. A very large majority of these investments have been made in the securities of American railways, and only a relatively small part of them in the securities of American industrials. From the time when war began to be seriously threatened until the stock exchanges were closed European investors dumped American securities, and especially railway securities, on the markets as fast as they could, the purpose being to take as much gold from this country to Europe as possible. The effect was rapidly to drive down the prices of American securities, and especially of American railway securities. How low our railway securities would have gone under this hammering if the stock exchanges had not been closed when they were nobody can tell.

The closing of the stock exchanges arrested the flood of railway securities coming home. But the war abroad destroyed the foreign market for American railway securities; and the closing of the stock exchanges has temporarily destroyed their home market. It may be that in a relatively short time the home market for them will be reopened; but the foreign market will not exist again until the war is over.

This means that the demand for American railway securities has been heavily reduced. If the supply of a thing offered in the market continues undiminished while the demand for it is thus curtailed, there can be but one result. That is, a great decline in its price. If, therefore, the prices at which American railway securities can be sold are not to be heavily reduced—and they were already very low when the war began—either the supply of them offered for sale must be curtailed, or by some means the demand for them must be stimulated.

It is easy to foresee the consequence of a reduction of the supply of securities issued. New securities must be sold to raise capital for new construction and permanent improvements, and a reduction in the supply of them put on the market must result in a proportionate reduction in the amount of expenditures for permanent improvements and new construction.

Assuming that it is not desirable that the amount of capital raised by railways for permanent improvements and new construction shall be reduced, how can the demand for their securities be maintained where a sufficient supply of them can be sold to raise the needed capital? There is but one way in which that can be done, and that is by so increasing the rates and net earnings of the railways as to enable them to pay rates of interest on their bonds and rates of dividend on their stocks which will make them attractive to a larger class of American investors.

Before the European war began it was conceded by all persons familiar with business conditions that the main thing needed to revive our industry and commerce was a renewal of railway development. The situation of the railways certainly has not been improved by the destruction of the foreign market for their securities and by the enormous reduction in their export traffic. Is it not desirable, for the general commercial and industrial welfare, that some energetic and far-reaching action be taken to strengthen the position of American railways, and thereby the position of American business generally? If the general of an army knew there were various weak places in his lines, but that there was one very important place which was the weakest and most vulnerable of all, would he not regard it as the part of wisdom to devote himself first of all to strengthening that place? And if the weakest place of all in the lines of American business is the condition of the railways, is it not the part of wisdom to devote ourselves at once to strengthening their position?

NEW BOOKS

Influence Diagrams for the Determination of Maximum Moments in Trusses and Beams. By Malverd A. Howe, Professor of Civil Engineering, Rose Polytechnic Institute. Size 6 in. by 9 in., 65 pages, 42 illustrations, bound in cloth. Published by John Wiley & Sons, Inc., New York. Price, $1.25.

The method of applying influence lines in analyzing trusses, arches and beams, is made clear in this little book, recently issued. The author begins by stating the single simple rule for drawing the influence diagram for all ordinary trusses, and follows this with numerous examples covering all cases for simple trusses. He then shows that the influence diagram for continuous trusses, cantilever trusses, arches and beams are based upon the same general diagram as is drawn for simple trusses. These diagrams are applicable without any computation. The diagrams shown in the book are constructed for moments, but the same rules can be used in drawing diagrams to indicate stresses or areas of truss members.

Terminal Facilities of North Pacific Ports. Compiled and edited by Welford Beaton. Size 5 x 7 in., 336 pages, cloth binding. Published by Terminal Publishing Company, 309 Burke Building, Seattle, Wash. Price $2.

Although this book is primarily intended for the steamship owner or shipper of goods by sea it is of great value to the railroad man who finds it necessary to have a good idea of the peculiarities and advantages of the Pacific coast ports from San Diego, Cal., to Nome, Alaska. The book contains most detailed information concerning the essential features of each of the ports considered, including the regulations governing the entrance of ships, the depth of water in the harbor and approaches, the wharfage, pilotage, storage and other charges assessed against either the ship or the cargo, the piers, the boat lines operating from the port, etc. In addition there are also lists of the American consuls stationed in foreign countries, list of consuls of other countries stationed at the Pacific ports, customs regulations, comparative tables of foreign monetary and other standards and much other useful and necessary information of that character. It is the intention of the editors to publish the book annually.

Air Brake Association. Proceedings of the 1914 convention. Illustrated, 242 pages. 6 in. by 9 in. Published by the association. F. M. Nellis, 53 State street, Boston, Mass., secretary. Price $2.

The Air Brake Association has made a record this year in placing the bound volume of the twenty-first annual convention in the hands of the members about two months after the convention met. This year's report includes addresses by H. H. Vaughan, assistant to vice-president, Canadian Pacific, and W. A. Garrett, formerly chief executive officer of the Pere Marquette, together with papers on Air Hose, Caboose Air Gage and Conductor's Valve, Electro-Pneumatic Signal System for Passenger Trains, Modern Train Building, and the report of the committee on Recommended Practice. Other subjects discussed were the Clasp Type of Foundation Brake Gear for Heavy Passenger Equipment Cars, and One Hundred Per Cent. Efficiency of Air Brakes. A tribute to George Westinghouse is also included in the proceedings. By prompt action of the executive committee immediately following the convention in Detroit, the secretary has been able to include in these proceedings the list of subjects selected and the committees appointed to report at the twenty-second annual convention, which will be held in Chicago, May 4-7, 1915.

Letters to the Editor

A PENNY SAVED IS AS GOOD AS A PENNY EARNED

NEW YORK, August 4, 1914.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The recent decision of the Interstate Commerce Commission advising economies in the railway field will warrant me in suggesting a means of saving which I adopted in Mexico in 1902. In that year, while superintendent of construction for the National Railways, the change of gage of that line was under way, and we were short of freight cars. Standard gage box cars had been received with a marked capacity of 80,000 lb., the cars weighing 36,000 lb. Flat cars received at the same time were marked, capacity 80,000 lb., and tare 32,000 lb.; or 4,000 lb. difference between the two. Trucks, journals, axles, wheels, trussing and all parts below the decks of the cars were identical. I took advantage of the difference and loaded the flat cars to 84,000 lb. regularly.

Since then I have had charge of two roads in operation and found the same error carried out in their equipment. I changed this, and on one of those lines increased the average load handled nearly one ton per car.

What is true of flat cars is true of gondolas, coal and ore cars; and, while it is true that there are few items other than rails, heavy machinery and sometimes timber that will load a flat car to capacity, this is not true of coal, ore and other such commodities.

I examined the cars of one of the big lines entering New York a few days since and noted that the same error still persists. It is obvious that there is no stress on tracks, bridges or any other railway structure which differs on account of whether the weight above center bearings is part of the paying or of the non-paying load. H. M. TAYLOR.

A CRITICISM OF RAILWAY COST ACCOUNTING

BALTIMORE, Md., August 2, 1914.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Referring to editorials and articles in your issues for July 24 and 31 on the division of expenses between passenger and freight service, I desire to call attention to a fundamental defect in the process.

What would be thought of a farmer who had five bins, into the first of which he miscellaneously dumped his wheat, oats, barley and corn; into the second, potatoes, carrots, onions and beets; into the third, apples, peaches, pears and plums; into the fourth, cherries, currants, blackberries and gooseberries; into the fifth, beans, peas, squashes and cucumbers? How difficult it would be to determine the quantity of each, and what amount of labor would be necessary to sort them out for market or for use!

Yet this is practically what is now done in railroad accounting, even to the mixing of passenger, freight, material and labor.

No cost accounting can be had until recourse is had to its fundamental basis, namely, a separation of its different particulars.

Material and labor are two entirely distinct and separate elements, in cost, of which a knowledge is necessary. Separation at the outset of any expense is simple and easy; separation after heterogeneous items have been combined is difficult and costly.

Properly designed and used requisitions for material, permit of such sortings and resortings as will give knowledge to any desired refinement. Work tickets, or service cards, will do the same for all labor.

Itemized items of this kind analyze themselves; being separately tabulated, the aggregates furnish the knowledge upon which correct judgments may be based.

No analysis of the present jumbled up reports can ever yield a basis for accurate thinking or furnish unit costs that will not be open to successful attack. F. LINCOLN HUTCHINS.

AN APPEAL FOR RELIEF FOR THE RAILWAYS

J. S. Bache & Co., members of the New York Stock Exchange, have sent a letter to 32,000 bankers in the United States urging them to take steps in the direction of securing an immediate and substantial advance in railway rates as a means of strengthening the business position of the nation. Their letter is as follows:

"Owing to the great European war, our financial situation is under an emergency pressure, because threatened by the unloading of railroad securities held by Europe.

"Our securities are in disfavor because of low railroad earnings.

"They should at once be made attractive to capital all over the world.

"This cannot be done unless our railroad securities are given a safe margin of earnings. The value of all other securities depends upon the success of the railroads.

"The railroads have proved and the Interstate Commerce Commission has admitted the necessity of enlarged revenues, but the rate decision grants only a meager and insufficient pittance—not more than enough to increase earnings one-eighth of 1 per cent on the total capital of the eastern railroads which made the application.

"This small advance will have no effect in restoring and establishing the confidence of the large investors here and the holders of our securities abroad.

"These securities will be sent over as soon as possible to do so, to draw our gold or its equivalent, and they will not be taken up freely by our own large investors because they have not sufficient confidence in the success of the railroads under the present scale of low freights.

"Rates need to be advanced materially in order to give such a margin of earnings that railroad securities will be sought.

"Further than that; the credit system of the world has been upset. We have lost Europe as our bankers. We not only cannot hope to place new securities in Europe: We are compelled to take back vast quantities of existing securities which for many years Europe has been absorbing. Every year our railroad systems have to spend enormous sums to increase and extend their transportation facilities to meet the growing demands of American commerce. Where are the railroads to obtain the money with which to make the needed additions and improvements? They cannot turn to Europe: American investors are not attracted under present conditions; they will have to look to their earnings until the confidence of investors is restored.

"Needed raises will start all the business of the country towards a prosperous level, because of the confident buying of railroad securities which will then take place, and because of the heavy purchases which the railroads will then be able to make, but cannot make now because of lack of funds and credit.

"This is now a national question and relief should be given to the railroads immediately, in view of the emergency necessity.

"We, therefore, earnestly suggest that you bring this matter at once to the attention of your representatives in Congress, and if you agree with us, urge them to favor the passing of a joint and concurrent resolution of the House and Senate directed to the Interstate Commerce Commission, requesting it, because of the emergency situation with reference to railroad securities, to review and revise the decision in the recent application of the eastern railroads, and in their discretion and in view of the great and extraordinary necessity for this action, to promptly grant further and adequate advances to all the railroads.

"No financial move could be more beneficial now than to make our securities so attractive that the funds of the investing world would be irresistibly drawn to this country.

"This would be accomplished if the railroads were given full and ample earning power. It would stimulate the whole industrial structure and enhance the values of all other securities.

"Will you give this matter your earnest attention and will you kindly let us know if you agree and will act?

"If you approve, please ask some of your larger shippers also to write or telegraph to Washington."

The Operation of Large Classification Yards

Third Series* of Abstracts of Papers Received in the Recently Decided Contest on This Important Subject

EFFECT OF OUTSIDE INFLUENCES ON YARD OPERATION

By F. Lincoln Hutchins
Baltimore, Md.

Efficient operation of yards depends mainly upon right conditions. Little improvement can be expected until many things, extraneous to the jurisdiction of the yardmaster, have been changed. Small kinks and minor improvements will scarcely affect the tremendous terminal expense, which Hadley says has grown during the last 20 years so that, while the cost of line-of-road movement has been enormously decreased, the cost of yards and terminals has been tremendously increased.

The problem deserves wider treatment, for this gradually increasing cost is mainly due to faulty management. Moreover it is difficult to see how special methods can be made of general application. No two yards are alike in arrangement or in the class of business that they handle, and the methods which would be of great efficiency in one situation might prove to be very inefficient in another. Hence an article devoted to the consideration of more efficient and more economical yard management must take up matters outside of the regular yard operations.

At the outset it may be questioned if the establishment of large yards leads to economical operation. It is the universal testimony that no yard was ever made large enough to hold all the cars that tend to come to it. The temptation is to overcrowd any yard that has a reputation for bigness. Every one at a distance thinks that its capacity is unlimited, with the result that more switching is created, more storage demanded, and there results a general movement of cars towards it from all the contiguous territory. The inevitable consequence of all this is that the large yard is often worse off for room to properly carry on its functions than before its enlargement.

The location of classification yards in many cases is open to criticism. Economical working conditions are sacrificed to accidental ownership of land, geographical situation, divisional boundaries and other considerations. How seldom is the man nearest the work called in to consult with the engineering department in deciding what arrangement will best conserve economical working? Who is so well qualified as the yardmaster to know the movement of traffic and the particular arrangement of tracks that will permit of the greatest facility in handling it?

Yards at connecting points, either with other roads or with different divisions of the same system, lead to large losses through dumping into them heterogeneously marshaled cars, followed by the turning over to the connections of cars in like disorderly array. It is the rule, rather than the exception, to depend upon large classification yards to correct the lack of orderly arrangement in collecting and despatching cars along the line. "Let George do it" is a costly method of procedure when the total travel of the car is taken into consideration and when it is taken into every classification yard for re-classification during its journey.

The highest economy in yard operation is to be obtained by keeping cars out of yards to the greatest extent possible, although the contrary practice is now the rule. The reputation for large yard capacity encourages the idea that accommodation exists for the storage of large numbers of cars from which selections may be made to suit the convenience of wholesale shippers. Cars thus held for disposition cause large expense, which is not properly appreciated. This expense is also further needlessly increased by permitting shippers to order forward certain products by car number. Orders to forward certain kinds, or grades, would greatly reduce such expense, for instance, in the matter of coal.

The first need is to adopt all possible means to keep cars out of classification yards. In the fast freight service it has been found that this requirement is imperative to secure quick despatch and that it is necessary to so make up the trains as to secure the longest rolling distance without yard service. Similar attention to ordinary freight would tremendously decrease the cost of yard service, increase per diem mileage of cars, and effect other economies. The Pittsburgh & Lake Erie is a notable example of the application of this principle. Large yards were vetoed and small accumulating points were established from which solid trains for terminal points of the road were run without breaking up at the different yards.

Parsimony in matter of inspection is very expensive. General officers examining payrolls are likely to cut out inspectors and in so doing increase other yard expenses far beyond the picayunish amounts that they think they have saved; enough attention is not paid to the costly result of delays to the switching locomotives and crews, to say nothing of the preventable breakdowns on the road. Economical inspection is only obtained when it is absolutely thorough, and sufficiently rapid to interfere least with the regular routine of yard work.

Yard records have further largely increased yard costs, and needlessly so, for the reason that improvements in accounting have not kept pace with the growth of business. The present reports are inefficient and require unnecessary duplication. The ideal car record is obtained by having an individual slip for each car, either brought in with the car or made upon its arrival. Such a slip formed to carry all the information that may ever be needed as to car or contents permits of instantaneous reply to all possible inquiries and prevents all duplications. Such records when aggregated will furnish results of all yard operations to as fine a degree of refinement as may be desired with a minimum of cost and avoid the necessity of taking lists of yard, either daily or periodically.

Lack of regularly scheduled work for switching crews is partly due to the irregular nature of the business, but where such schedules have been installed there have resulted a betterment in operation and great reductions in cost. Yard operations may be scheduled, as are trains on the road; it would be as unfair to say that this is impracticable in yard work, because of irregularities, as to say that scheduling of trains is impracticable because wrecks and other delays occur on the line.

Many yardmasters endeavor to carry all the confused and complicated operations of their yards in their own minds, making conductors of switching crews work under their specific instructions. This is a most inefficient method, leading to costly use of power and labor. The most economically worked yard is where the yardmaster has the least to do; that is, where the regular operations of the yard are properly scheduled and the individual conductors are held responsible for the fulfillment of the schedules given them. Having definite tasks a conductor is better able to utilize his time and to avoid extra moves, while without such schedules one cannot plan ahead or take advantage of accidental happenings, while losing much time in obtaining special orders for each piece of work.

Orders from traffic and other high officials for special movement of cars is a grave hindrance to orderly prosecution of yard work. This practice has cost very large sums, unknown to the managers, because the accounting methods are not fitted to divulge the expense consequent upon this practice. Until it is realized that patrons of the road, however important, are not entitled to special, out of order service, not much can be done to obviate the expense due to this uneconomic operation.

Marvelous differences are found in the capability of men in the effective handling of a yard locomotive. I had working for

*The prize article and several others were published in the issue of July 3, and several other contributions were also published in the issue of July 24.

me at one time a genius in this line. A person watching would be puzzled to know what he was trying to do, for apparently he was mixing up rather than sorting out; but by cutting his train in a certain place and keeping one class of cars with his locomotive, thus giving him an extra track, he was able to marshal the cars on a limited number of tracks in the required order with a minimum number of moves. Such a man as an instructor can do much to educate other men in the proper handling, thus reducing the cost of the operations. What railroad has secured expert yard operators and sent them out to its different yards to instruct the local men as to the best switching practice?

Many conductors haul their trains just over the switch point and push the car or cars they wish to detach onto the proper track; then again, moving out just over the switch, they repeat the operation for the next cut and so on until they have disposed of all the cars. If, instead of so doing, they had hauled the cars further away from the switch in the first place, they might have made all the cuts without calling for one movement of the reverse lever, saving in engine expense and in the time of the crew.

In these days of "safety first" it may seem unwise to suggest that brakemen be required to catch slowly moving cars for the purpose of riding and braking them, but properly done this is not a dangerous proceeding, as is well proved by many years of this practice upon many roads without unfortunate results; only in this way may a train be broken up with the least loss of time and with a proper degree of safety. With sufficient leeway several cuts of cars may be moving to their several different destinations at the same time with the greatest effectiveness and economy of operation.

ADVANTAGES OF ADVANCE INFORMATION ON TRAIN CONSISTS

By Jas. D. Schaefer
City Passenger Agent, Chicago, Milwaukee & St. Paul, Pittsburgh, Pa.,
and Nelson J. Flocker
Bessemer & Lake Erie, Pittsburgh, Pa.

A yard is not intended primarily to hold cars, but as a place from which they are to be despatched. Of primary importance in the efficient operation of a large classification yard is its location. Much depends on this with regard to grades and dimensions, with the view of projections in the future. Many yards are hampered for room to take care of the increased traffic over that handled when they were originally laid out. In this connection it is well to call attention to the fact that many present-day yards are the outgrowth of a layout of tracks designed to take care of the traffic of 20 or more years ago, when business was light and cars were of small capacity and dimensions.

The despatch with which cars are prepared for movement over a hump depends on the system of marking. The present system in many yards is by crayon for loaded cars prepared from the manifest and for empty cars taken from the train, with a triplicate "cut sheet" prepared by the car marker. This sheet shows the number of cars in each draft and the track in the classification yards on which such cars are to be placed. The original copy (provided the switches are thrown from a tower) is furnished to the leverman, another copy to the car-cutter, and the third copy is kept and checked by the conductor and reported to the yardmaster to keep intact the data regarding the hump's operations. A suggestion for improvement of this method would be to have this information furnished the car marker by wire in advance of the arrival of a train, in order that switching lists could be provided, so that the cars will be marked for classification upon the receipt of the train. In this way the cars would be ready for hump classification without any material delay, and the hump would only have to perform the function for which it is primarily intended, namely, the classification of the equipment. Another advantage of this suggestion is that it does not require the same power to move a train of cars onto the hump when it is received under power as when the movement is a "dead" one. This feature would be aggravated in cold weather.

Perhaps the objection would be made to the suggested system that no opportunity would be allowed for inspection for bad order cars in the receiving yard. However, this could be obviated by a road inspection for such defects, before receipt at the classification yard, preferably at the water tank stop immediately preceding entrance into the receiving yard; bad order cars could be carded at that point. The defective cars could then be classified for repairs on the hump. In case a car becomes defective between the inspection preceding the entrance into the receiving yard and receipt at the yard it could be set out on the bad order track at the despatching end of the yard, as such inspection for light defects and air hose connection is always made at that point under present practice. Notation of many of the defects could also be made by switchmen or yard brakemen when going over the train to cut the air hose preparatory to moving the train over the hump. This method of handling cars preparatory to the hump classification does not in any way contemplate the discontinuance of the present manner of reporting, nor the abolition of the "cut-lists."

When one of the writers was assistant general yardmaster of one of the larger southern lines in Tennessee, there was a complete shutdown on empty cars on the division east of the point at which the classification yard over which he had jurisdiction was located. At that time he was making up through solid trains for five southern terminals. As they were being made up these trains had a fair proportion of company box and coke cars in their consist, the balance being perishable freight. The situation seemed to grow worse and it was necessary to reclassify to rush forward the perishable freight. A blockade was imminent, and while we got through all right a lesson had been learned. After clearing up the yard, a new system was inaugurated which was then an innovation in yard car handling in that region. Thereafter when word reached the office that there would be a shutdown on eastbound cars, we would classify all company cars and hold same on outside tracks. However, as fast as power could be obtained, foreign cars were moved out of the way, carded for movement toward home, with the result there was no reclassifying, and all cars were ready for movement in solid trains for the south. We were handling about 2,800 cars on an average daily, probably 33 per cent. foreign equipment.

SOME IMPROVEMENTS IN THE OPERATION OF A FLAT YARD

By Fred P. Grossman
General Yardmaster, Chicago, St. Paul, Minneapolis & Omaha, Minneapolis, Minn.

The use of hump yards for the classification and breaking up of trains works well in the fall when the business is heaviest. One engine on a hump can break up more trains effectively and classify more cars than an engine can in a flat yard, but it requires an army of switchmen and switch tenders to throw switches and keep the cars going onto the track assigned for each individual cut of cars. The damage to cars is also far greater on a hump than in a flat yard, and the claims following, coupled with the enormous amount of help required, must be kept in view.

I am in favor of a flat yard, with a graduating decline from the switch lead onto the various switching tracks. An engine on a lead of this kind can pull more cars up the lead, and it does not require as many switchmen and switch tenders to guard the movement of cars. Cars are not so easily broken, and the consumption of coal and water is about the same. The cars are allowed to move more freely, and a man in charge of the engine can control his helpers better and give better results for the expense incurred. A yard of this kind with an entrance to the tracks on both ends allows the cars to be pulled away from the lead engine without interrupting the work, and there is no lost motion to the lead engine. A foreman of an engine in a yard of this kind, trained to make the proper cuts in break-

ing up trains, can pull back on the lead, and by the time the engine comes back to where he is will have disposed of all the cars, and be ready for another cut. This makes a yard very effective and economical, and a switch engine will handle very nearly, if not as many cars as an engine on a hump, with about one-half the help.

The bad order proposition is handled in our yard by training the car repairers to mark bad order cars, loads and empties, and heavy and light repairs. The light repairs predominate in every yard, consequently we assign two tracks for this work, the light repair loads being set ahead of the empties. This also holds good with heavy repair loads and empties. Our light repair tracks are pulled twice in each 24 hours and the heavy repair tracks but once.

In addition to these repairs, I would call attention to another system we have inaugurated. Our merchandise box cars for out-bound freight are largely made up of cars with minor defects; while spotted at the out-bound freight house for loading, two men make the necessary repairs, with occasionally an additional car repairer pressed into service. This plan has proved economical, as well as successful, and keeps the yard free of light repair merchandise box cars.

Our trains have all been assigned to handle certain classes of commodities and for certain destinations. This keeps the high class freight moving promptly, the first train out being made up with through cars, the second taking the overflow, the next the short hauls, and so on down to the dead freight. In the fall these trains are run in sections, but we never deviate in the class of freight handled in each train, except where dead freight is used to fill out tonnage. Trains on other divisions are lined up so that local cars are either on the head end or the rear; the local cars are taken off, through cars are added and the engine and crews changed with no delays.

A yardmaster must know every inch of room in his territory, and must know perfectly at all times the exact situation of every track in his yard. This enables him to handle almost double the amount of cars actually held in his territory.

One of the most complex problems confronting a yardmaster is to eliminate terminal overtime. An engine working directly in a given territory can be manipulated in such a manner as to stop work promptly at the expiration of ten hours, but when an engine goes into a connecting line yard, one loses control of it. In our yard switch engines have been given special hours to commence work, and must retire when they have worked ten hours. In order to divide the work evenly, we start engines at 6:30, 7, 7:30 and 8 A. M. This gives us an engine at all times, and the night force commences work the same way. In this way overtime has been cut down from 250 hours to 25 and 30 hours per month. The most surprising part of it was the efficient service created by this change. Formerly our engines handled on an average of 75 cars a day, while at the present time they are handling an average of 120 cars a day; in the fall this has run up to 162 cars per engine. The physical condition of our yard is against us, and in addition we receive only credit for cars coming into and going out of the yard, no credit being received for work done within the yard. The saving in fuel was enormous, switch engines now averaging about three tons per ten hours against four tons before the change was made. A reduction was also noticed in the water supply, engines now going to the tank twice a day against three and four times previous to the change. After the crews became accustomed to the change of working ten hours straight, they seemed to feel that we were imposing on them when we asked them to work overtime. The service was also better, as the men were in better physical condition, and never loafed as they did when they were working 12 and 13 hours a day.

Before the change in hours was made, the average cost per car for the year was 38 cents; after the change was made, the average cost for the year was 35¼ cents per car, or a saving of 2¾ cents per car. During this latter period we were also hampered by construction work and gravel trains, about 12,000 cars of gravel and about 900 cars of company material being unloaded. This, of course, delayed us considerably, as our yard has peculiar physical characteristics and is at times hard to work.

SYSTEMATIC OPERATION OF LARGE YARDS

By F. E. RAMSDELL

Freight Trainmaster, Pittsburgh & Lake Erie, McKees Rocks, Pa.

In order to successfully operate a terminal, classification or break-up yard, it is of vital importance that the yardmaster surround himself with good, careful and reliable men in order that the system of the yard may be carried out in every detail. A competent and intelligent yardmaster will inaugurate a system of reports whereby any failure of the system inaugurated by him will be promptly detected, the error corrected, and any delay to any detail work of the yard avoided. Should a yardmaster discover any careless act on the part of any of his force, he should immediately conduct a careful investigation, applying discipline if necessary. Should he discover further acts of carelessness on the part of the same employee, he will make no mistake in taking him out of the service, as one careless employee will often be the means of causing careless acts on the part of other employees, especially new and inexperienced men.

In order to obviate delays to cars in large yards, it is necessary for the yardmaster to establish a system of yard checking, taking an accurate check of each track in his yard at least once every 24 hours. This report should be personally handled by a thoroughly competent yard clerk, whose business it should be to check all cars with the bills. If this is done any delayed car will be immediately discovered, and a necessary report made to the yardmaster, whose business it is to see that the car is switched out and moved promptly. Delay to cars can only be overcome by constant watchfulness on the part of the yardmaster and his holding certain members of his force personally responsible for any unnecessary delays that may occur.

In order that terminal overtime may be reduced to a minimum, it is necessary for the yardmaster to anticipate movements, watching closely all reports of train arrivals, considering the number of cars for which track room will be required, and arranging his work in such manner that upon the arrival of these trains he will have sufficient room in his receiving yard to take the trains in promptly and avoid such overtime. To successfully minimize terminal overtime, the yardmaster must be a man of excellent judgment and farseeing qualities. Such a yardmaster can save his salary several times each day, and therefore greatly increase his prospects for further advancement. A yardmaster should see that his subordinates arrange the work for his switch engines to obtain the highest possible yard revenue for each movement, thus avoiding unnecessary engine mileage. He should also arrange his work in such a way as to avoid any unnecessary delay caused by any congested condition that may arise in the yard.

After many years of practical experience, I believe that the only method to pursue that will insure the prompt handling of special traffic such as fast freight, etc., is by inaugurating a system as follows:

(1) Keep special traffic separated from slow traffic.

(2) Establish a system of reports showing the arrival and departure of such trains in the yard; also noting any delays occurring either because of the motive power, car, or yard departments, showing the amount of time consumed by the inspection and testing of air, the time consumed in classifying and building up the train, and also any unusual delay it may receive.

(3) The classifying of such cars should be as far-reaching as possible to reduce the handling to the lowest possible minimum, thereby avoiding serious delays to such freight by reducing the liability of damage to both freight and equipment through too frequent handling.

(4) A certain time should be allotted in the yard for the yardmaster to get such trains through his yard, and it should be his duty to see that this time is not exceeded under ordinary con-

ditions. By a system of reports as above outlined, unnecessary delays can be readily detected and corrected.

Blockades in yards are caused by the inability of connecting lines to accept freight promptly; by accidents; by weather conditions, and occasionally by a lack of power. These conditions can hardly be overcome. However, under the ordinary conditions and if proper judgment is used by the yardmaster, an auxiliary storage yard of sufficient capacity beyond such classification or break-up yard will permit him to store his slow freight there, giving his fast or preferred freight a chance to move from the classification or break-up yard on its regular schedule.

In conclusion, to successfully operate a busy classification or break-up yard, it is of vital importance that all freight be moved currently, the yardmaster bearing in mind the importance of keeping sufficient track room in order to take in incoming trains promptly, and also provide sufficient room for classification purposes. A yardmaster should be in close touch with the chief despatcher, working in harmony with his force, and he should be willing at all times to co-operate with him in any way desired. He should also bear in mind the importance of properly making up trains, so as to minimize the delay to such cars at the next break-up yard, as a move in his yard will prevent a delay in the next yard.

SOME CAUSES OF DELAYS TO YARD FORCES

By J. L. Coss

Assistant Chief Despatcher, Chicago, Rock Island & Pacific, Haileyville, Okla.

A yardmaster must possess more than the average ability and qualifications and must be supported by clerks and others who are inclined to display an interest in the work, and especially more so if the yard facilities are cramped. A thorough and complete check of the yard should be made twice a day, the time to be governed by the conditions, by a competent person who understands the handling of traffic and that the delay of cars is the most important question.

Material for repairs to cars is often short and cars must be moved to certain points for certain repairs. Frequently requisitions for material are reduced to such an extent that shops are always out of this or that, while the cars needing the material are standing in the yards in the way of other traffic. When material is ordered from the car owners for repairs to foreign cars, sometimes it is received in 10 days and sometimes in that many months, still the car is standing still. It has been noticed frequently that brasses were not to be secured at the storehouse and a meat train on the road was compelled to rob another car and set it out to brass the perishable freight.

Home route cards are responsible for certain delays to cars for the reason that in many cases the general office must be wired for disposition, and as there is no one on duty in these offices at night and on Saturday afternoons, Sundays and holidays the cars remain until the reply to the inquiry is received. If the record in the car service office is faulty, the car may be a matter of dispute for days and weeks.

In my opinion diversion orders should not exist. The cars are billed out from commercial centers to some terminal and diversion orders are to follow; these may be two to three days behind and during this time the cars are in the yards. It seems that the shippers should have a sale for their materials before they start them out and not have the railroads acting as storehouses.

Cars are held in yards for tonnage all the way from 6 to 24 hours. We do not believe this is justified in spite of the figures showing that the tonnage train is the money maker, for the tonnage figures are made simply from the number of tons handled in the particular train regardless of any other account which may be affected.

A shortage of track forces should be avoided to insure the maintenance of yard tracks and switches to assist in the speedy movement of engines and cars. Yards should be kept clear of all obstructions and so arranged as to permit of the men moving with perfect freedom. The location of the yards should also be such as to avoid street and railway crossings as far as possible.

No doubt poor train despatching may seem to some a little beside the subject, but one may see switch engines standing still waiting for a first class train which is 30 minutes or an hour late, the delay not having been reported to the yard by the despatcher. These minutes could be used to advantage by the yard crews and might possibly save an hour or more overtime to the engine in the end. It may be that the despatcher has not given a close figure on an incoming fast stock or merchandise train, or if it fell down, he did not revise his figures for the yard.

Every employee on the railroad in a measure contributes to the delay of cars in yards. By being a little dilatory in making delivery of telegrams the messenger boy may be the cause of serious delay; by being a little late in calling a crew the caller contributes his share, the engineer being slow in moving out, his, and so on down the ranks.

KEEPING ALL CARS MOVING

By D. F. Stevens

Trainmaster, New York, New Haven & Hartford, New York City

The successful operation of a classification yard depends on the building up of a plan adapted to the volume of business offered and the physical condition of the yard, with ample supervision of the right kind to ensure the carrying out of the most minute detail of this scheme. To accelerate the movement of cars through a classification yard the trains or yard "drags" must be classified in the order of arrival, giving preference to the perishable and high class freight. It then becomes necessary to put road power into the yard as rapidly as the classifications are made and to keep the freight moving out from under the feet of the yardmaster in charge.

At a certain large water-front terminal in mind 30 eastbound classifications are made, caring for some 1,200 cars per day under normal conditions. Of this number probably 1,150 will ordinarily move out of the terminal in good time. The remaining 50 are the "trouble makers," and the efficient yardmaster knows that his supervision is required to speed up these sluggards to at least approximately normal speed. He must see that the shop and defect tracks are switched at the hour set and not permit this to become a convenient task to be performed after everything else has been attended to, and the repaired cars coming from these tracks should be drilled out at the head end of the yard, thereby saving the time ordinarily required to move the length of the classification tracks.

In the yard under consideration there are, in addition to six eight-hour trick yardmasters, two higher priced men who are not burdened with detail work, thus enabling them to exercise general supervision and check to avoid delay to cars, these cars being handled on chalk marks. These men walk over the tracks, looking for such cars as may seem to be delayed, and, if any are found, they cause them to be put in train line for the next train of proper classification. A note is made of the occurrence and it is followed up to ascertain the cause of the delay. This is followed by the application of the necessary remedy to prevent a recurrence. These men also check up the bill rack each morning and evening to see if any old dates show on the card manifests. If any are found they locate the cars and start them moving.

A feeling of personal pride is instilled in the mind of each employee in the yard to the end that every old car becomes a personal reflection upon him, thereby adding much individual supervision. A record is kept of the number of cars switched in each yardmaster's shift and this is given daily to the yardmasters, so that each man knows exactly what the other is doing. This has resulted in increasing the number of cars switched about 150 per day.

When a car is delayed, resulting in a complaint from either the public or the higher officers, the man responsible is inter-

viewed by the trainmaster in person, all the papers in the case being given in, and he is required to explain the error and his understanding of the proper method of handling. In most cases his interest is stimulated. Cases of accident or personal injury, no matter how small, are always followed to a conclusion. The man responsible is located and he is required to explain just what he did, how he could have avoided it, and the way in which it should have been done.

A yard standing, taken every day at 7.00 a. m., and showing the date of arrival of all cars in the yard and their track location, aids materially in reducing the number of old cars. Every two weeks a check is made by the trainmaster, taking an entire day, and the effect seemingly justifies the action.

Yard figures and costs are available to everybody at the terminal and it is surprising and pleasing to find the mechanical and roadway men taking an interest in breaking records. When going at full speed, under high pressure, the master mechanic and road foreman of engines spend their time with the enginemen, explaining to them what is to be done. The response is always apparent. The track supervisors take almost as much pride in the number of eastbound cars put out in a 24-hour period as do the operating men.

If a man shows by his actions a desire to "hit the ball" and to keep the terminal at the "top of the railroad league," every effort is made to help him in every possible way. Unless he becomes chronically bad every effort is made to retain him. Dismissal follows intoxication, insubordination, and dishonesty, and everybody knows it. There is little of either.

While many little tricks of the trade are worked out in actual practice, as the occasion may demand, it is believed that in operating a big classification yard the main thing is the class of men working in it. To secure the desired result it is probably better to employ green men of good habits and break them in, letting your neighbor hire the "boomers." After a man is on the payroll he should be given to understand what is to be accomplished and educated as he goes along. Employees should be imbued with the idea of not being satisfied in remaining brakemen, but to become trainmasters or superintendents. A certain amount of dignity should be maintained, and this is not incompatible with a friendly feeling. Ambition should be encouraged and individual responsibility developed. With these traits the question of the "old car" need not be a disturbing factor in any terminal.

PERSONALITY IN YARD OPERATION

By O. C. Hill

Assistant Superintendent, Chicago, Burlington & Quincy, Kansas City, Mo.

The organization of forces should provide for a general yardmaster, both days and nights, assistant yardmasters day and night on the hump and in city yards, an inside or desk yardmaster days and an outside yardmaster nights, a chief clerk day and night, bill, manifest and diverting clerks, and car checkers. The assistant yardmaster on the humps should be in charge of the hump and trimmer engines and the engines in the departure yard. The desk yardmaster should be in telephone communication with all parts of the yards and departments, keeping in direct touch with them, and should adjust the slack and congestion in the different yards, directing the power from one district to another. He also should get a check of the tonnage switched and waiting to be switched for all directions and the consist of trains on the road, enabling him to determine some time in advance the amount of tonnage that he will have to move in the different directions. These measures will enable him to avoid congestion, terminal overtime and terminal delay of all kinds. He must be vigilant continually to insure the economical operation of the yard.

The general yardmaster should have direct charge of all organizing and planning of the yard work. He should be a hard-fisted man, who is familiar with the work and who is capable of leading his forces, while, at the same time, speeding up the weaker ones and crowding them to the front. He must impress his personality upon all of his employees, with the "ego" left out. He must be an impersonal judge and see that the employee as well as the employer receives his just dues.

In furnishing car checkers and markers the fact should never be lost sight of that they are cheaper than switch engines. Competent car checkers and markers should be located at the entrances of the yard and should be paid a living wage to eliminate constant changing of clerks. Cars should be carded and waybills forwarded to the office promptly, and the carbon of the conductor's list should be furnished the assistant yardmaster. The switch list is a photograph of each train. The diverting clerk should check his diversion orders with the respective car markers. All work of the yard department should be carefully checked and a careful "turn over" made each day to the night forces and each night to the day forces, so that each shift can take up the work where the other dropped it. Care should be exercised in the selection of assistant yardmasters and foremen, and those men should be chosen who have the ability and also the courage of their convictions and who can perform their duties regardless of the criticisms of the employees. In employing switch tenders, care should be exercised to secure bright, capable young men who can be advanced later to switchmen and yardmasters.

The assistant yardmaster should be in direct charge of all employees at the terminal at night, for occasions may arise that require immediate attention and decision, encroaching upon the so-called prerogatives of other departments. For this reason it is necessary that the night yardmaster should represent the heads of all other departments at night and that he have their support while they are asleep and he is working.

PRACTICAL SUGGESTIONS FOR YARD OPERATION

By J. P. Kavanagh

Assistant Superintendent, Baltimore & Ohio, Baltimore, Md.

A classification yard should be of good proportion, located so as to be within easy reach of the bulk of the traffic in both directions to permit of making classifications for as great a distance as possible in each direction. Classifications should be made with a view to enabling trains to travel over as many divisions as possible by changing engines and avoiding the necessity of taking all trains into the yard at the end of each division. This yard should be limited to the handling of slow and expedite freight; should handle traffic in both directions and should be so constructed that the humps will be in close proximity to each other. There is no question but that such a yard should be a hump yard, divided between the direction of traffic, and so planned that each yard can be operated without cross haul.

Independent humps should be maintained in each direction for the handling of fast freight trains. It is essential to have the fast freight handled in the same vicinity as other freight, as pick-ups and short runs coming into the terminal will always have cars intended for such trains; furthermore, it is a good practice to incorporate a transfer station, as generally local freights from two or more divisions will start and finish there, and this transfer station will make cars for all of the fast freight trains.

The operation of a classification yard, as defined, comes under the direct charge of a terminal trainmaster, reporting to the superintendent. His authority over the yard should be without question, and his jurisdiction extended to cover all employees connected with the yard. A yardmaster should be in charge of each slow freight yard with sufficient clerks to handle the business in an up-to-date and intelligent manner. Both fast freight hump yards should be in charge of one yardmaster, with a yard clerk in each of the hump yards; the number of engine crews and the hours of service to be regulated as conditions demand.

Much can be accomplished in the proper handling of the receiving yard, by giving attention to its construction. The aim should be to locate it as nearly as possible on a tangent with an easy grade up to the apex of the hump, making it possible for the class of engine that brings the trains in to shove them over

the hump. Nothing retards the work of a hump more than incoming trains doubling over this yard.

The classification yard should be built on more or less of a curve, on account of the difference in weight of cars and the possibility of handling both loaded and empty cars over the hump. The hump should be so constructed as to insure all cars getting a good start. Heavy cars should be worked to the curved tracks and the light ones to the straight tracks. This, in many instances, will save the necessity of shoving the light cars into the clear.

When the departure of trains out of yard is limited to any extent and it is possible to despatch trains only during certain periods of the day, which condition occurs more frequently on a single track line, the efficiency of the hump engine is increased by advance yards, and trains despatched from such yards invariably show less transportation delay than those despatched from the classification yard. It is, of course, more expensive to operate a yard requiring engines to move trains from the classification yard to the advance yard and we believe that when there is no restriction on the movement, it is better from every standpoint to despatch trains direct from the classication yard.

Car inspectors should keep a record of all cars discovered damaged and report to the yardmaster, so that it can be taken up with the rider, as cars going over the hump should be in proper condition, and if found damaged the rider should be required to explain the cause. By this method, a tendency towards carefulness is created on the part of the inspectors in the receiving yard and the riders.

One of the principal factors in lessening the delays in yards is the repair yard and, in my judgment, this yard should be so constructed that cars can be dropped from the trains as they are switched over the hump onto the repair track, spotted by the rider and repaired without the necessity of a second movement; to do this, requires about five per cent. more room on the repair track than is usually needed and it is my belief that each repair yard should have a capacity of eight per cent. of the total number of cars handled into the yard. Tracks should be built with 18 ft. centers to allow repairmen to work on cars on a filled track without interference by reason of cars being dropped into tracks not filled.

UNIFORM INSPECTION FOR SPECIAL LOADING

The Rock Island Lines has recently issued a pamphlet of instructions covering the uniform inspection and carding of empty box cars, the coopering of cars for grain loading, and the stripping of doors of cars loaded with flour, with a view to having the men well informed and ready to meet the heavy harvest traffic which, from the reports, will be one that will

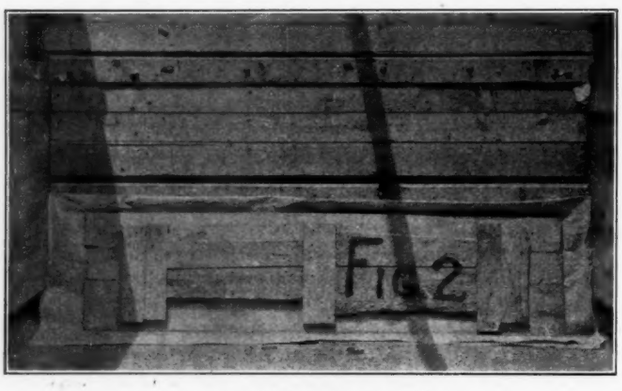


Fig. 1—Repairing Defects in Lining

greatly tax the resources of the road. The pamphlet represents the work of a committee composed of the assistant to the second vice-president as chairman, and other officers who are directly interested in the inspection and handling of cars for special commodities. The following extracts are taken from the pamphlet:

When empty box cars have been repaired, they should be inspected and carded in accordance with the following classification before leaving the repair track:

The maximum use cannot be obtained from box cars if first-class cars are loaded with commodities which damage the floor or lining, stain or saturate the floor with oil or grease, leave a stench, make unfit for carrying flour, merchandise, etc.; or which could, with safety, be loaded in a car in poorer condition or in a car of a different class.

To reduce to a minimum the difference of opinion between car inspectors, the following rules have been provided, specifically indicating the "parts to be examined" and "conditions required" to properly card cars for various classes of lading:

INSTRUCTIONS TO CAR INSPECTORS COVERING EXAMINATION OF EMPTY BOX CARS AND CONDITION REQUIRED TO PROPERLY CARD THEM FOR LOADING FLOUR, CEMENT, GRAIN AND ROUGH FREIGHT.

Parts to be EXAMINED	For FLOUR	For CEMENT	For GRAIN	For ROUGH FREIGHT
Safety appliances.	Must be O. K.	Must be O. K.	Must be O. K.	Must be O. K.
Draft rigging.	Must be O. K.	Must be O. K.	Must be O. K.	Must be O. K.
Posts and braces.	Must be in place and in good condition.	Must be in place and in good condition.	Must be in place and in good condition.	Requires safe running condition.
Siding.	Must not be loose, broken or decayed.	Must not be loose, broken or decayed.	Must not be loose, broken or decayed unless can be coopered.	Requires safe running condition.
Roof.	Must be in first-class condition.	Must be in first-class condition.	Must be good, but not necessarily first-class condition.	Not necessary to be in good condition. Safe to run.
Doors.	Must be in first-class condition.	Must be in first-class condition.	Operative and safe condition.	Safe condition.
Floor and lining.	Must be in good condition, free from protruding nails and from stench, account previously having been loaded with Fertilizer, Hides, Bone, Creosote, Oils, etc. Free from oil stains or saturations.	Must be in good condition.	First-class condition not necessary if coopering will make grain tight. **Do not O. K. for grain if floor is loose at side sills or is oil-soaked.** Must be free from stench, account having been loaded with fertilizer, hides, bones, creosote, etc.	Serviceable condition.
Grain strips.	Good condition not necessary.	Good condition not necessary.	Should be in place or in condition to permit of coopering so as to make grain tight and prevent grain from pressing against siding.	Not necessary.

GRAIN AND FLOUR CARS

The following instructions apply to the coopering of box cars after such inspection shows they are O. K. for bulk grain loading, or a higher class lading.

Cleaning.—Sweep the car clean, removing any foreign matter that may be lodged behind the lining.

Floors.—Carefully examine the floor for openings through which grain might leak, particularly over the body bolster,

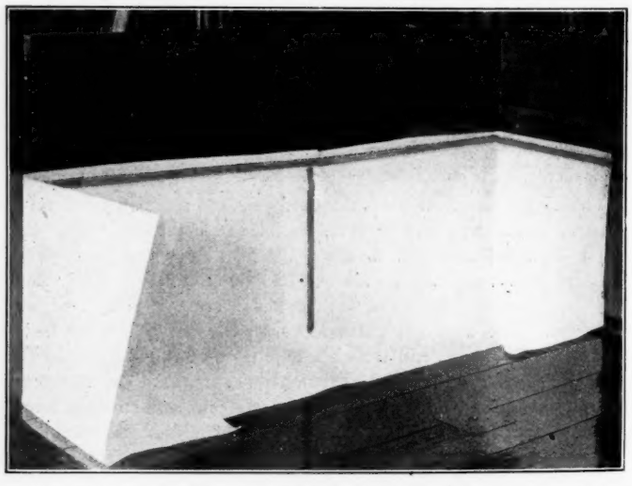


Fig. 2—Further Repairs for Defective Lining

around draft bolts and at the intersection of the floor and the end sills, and at the end, side and door posts. (Most leaks occur over drawbars, at posts over bolsters and at door posts.)

Where openings occur in floor, cover with cooperage paper; if at the junction of floor with posts and braces, use a pad of paper, securing same in either case by nailing a lath or board over the paper.

Where floor shows signs of weakness over the body bolster, cover it for the entire width of car with a piece of 48-in. cooperage paper folded to 24 in. width, securing it with lath and nails

at each edge of paper. If a similar weakness is found over the center sills between the body bolster and the end of the car, cover with paper same as over bolster.

Where bolt heads protrude through the floor and it is covered with paper, an additional precaution must be taken to nail a board over same.

Grain Strips.—Where grain strips are defective or not securely fastened to the floor, apply a paper pad extending 5 in. above the

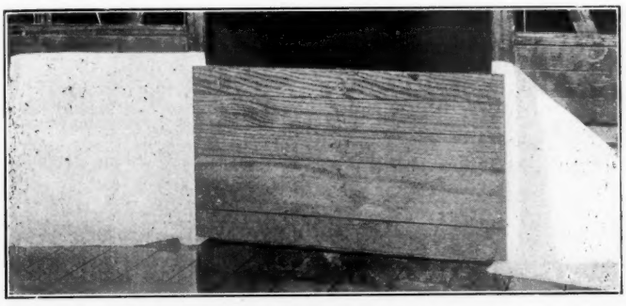


Fig. 3—Method of Applying Grain Doors

floor of the car, inserting it behind the lining and securing it by nailing a lath or strip of wood over it.

Lining.—Cover any broken or faulty places with cooperage paper over which a piece of board should be nailed. If the size of the defects warrant, cover with paper, over which nail a grain door. (See Fig. 1.)

When the lining is in generally poor condition, in addition to the above mentioned coopering, the defective portion should be protected by lining with cooperage paper 48 in. wide, allowing a 6 in. lap on the floor. When applying to the end of the car, begin at the side of the car about 2 ft. from the corner, fit into the corner and extend half way across the end of the car. Apply to other half of the end of the car in the same manner,

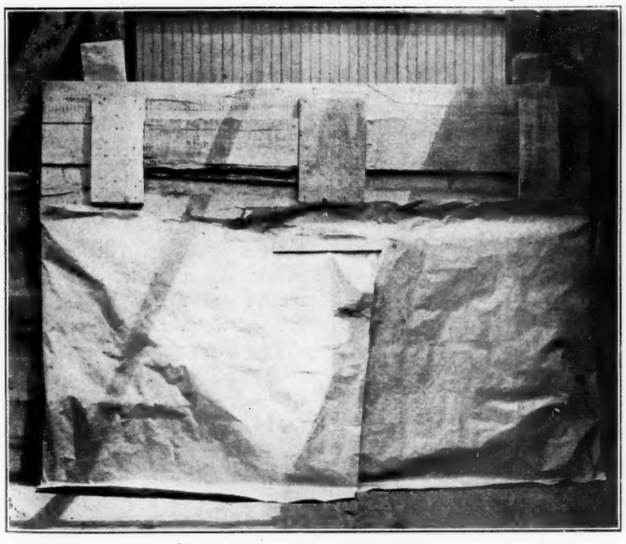


Fig. 4—Method of Applying Grain Doors

letting the ends overlap about a foot where they meet. Secure the paper with lath and nails about 3 in. from the top edge only, using but two 3d shingle nails to a lath. In order that paper behind laths may tear at nails and adjust itself when grain pressure is applied, do not drive nails up to head. (See Fig. 2.)

Cover end doors with cooperage paper and nail boards over the entire opening.

Grain Doors.—Apply three standard grain doors to each side of the door opening. Fold cooperage paper to four thicknesses, making a pad 4 in. wide on the end of a piece of paper 7 ft. long. Apply this to the inside face of the door post, allowing a few inches lap on the floor; then place one end of the grain door against this pad. Fold a similar piece of paper for the other door post and apply in like manner. An additional paper pad should be applied to the face of the door posts extending from the top of the pad above mentioned to the top of the grain doors; then nail the grain doors to the door posts, after which fold the loose ends of the paper extending from the door posts, so as to overlap on the inside of the grain doors, and fasten lightly at the top of the paper with lath and nail. (See Figs. 3 and 4.)

When applying hardwood grain doors, reinforce only cars of 80,000 lb. capacity or over, by nailing an additional grain door

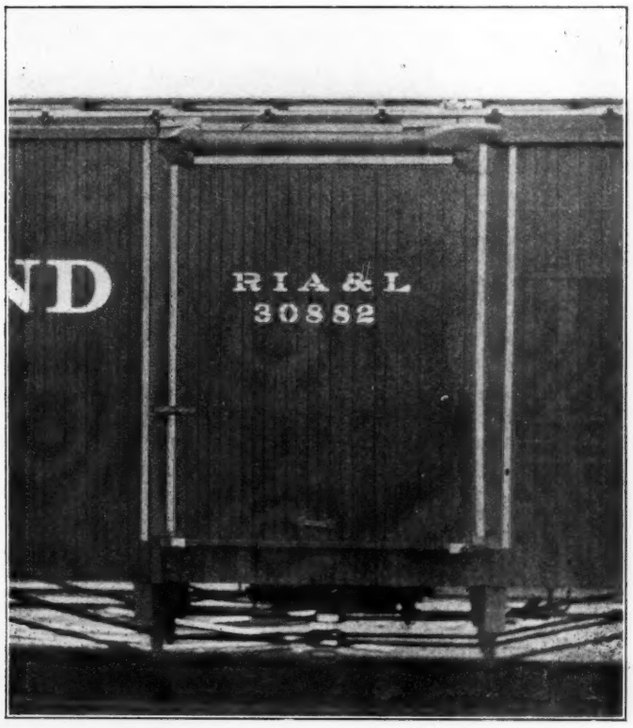


Fig. 5—Cars Stripped for Flour Shipments

lengthwise over the two lower grain doors on inside, with its lower edge about 8 in. above floor. Apply same over cooperage paper.

When applying softwood grain doors, reinforce with two additional grain doors, apply over cooperage paper, placing the lower door about 4 in. from the floor.

Outside Inspection—Siding.—Inspect sides and ends, securely fastening any loose siding with 8d wire nails. Where sills are decayed, prevent leaks at siding by using a pad of paper fastened underneath with a strip of board nailed to bottom of sill.

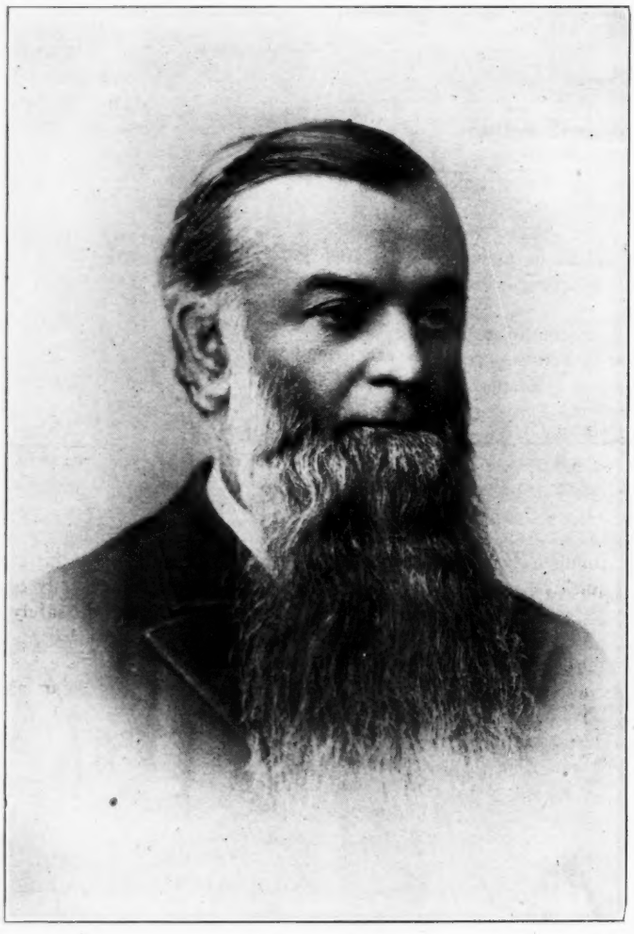
Stripping Cars Loaded with Flour.—To prevent water damage to floor, the side and end doors of cars loaded with flour should be tightly closed by driving a wedge between door and door-guides, after which apply a strip of 11 in. wide odorless tar water-proof paper over the sides and top of the doors, securing it with lath and nails. (See Fig. 5.)

THE RAILWAYS OF ARGENTINA.—The total mileage of the railways of the Argentine Republic at the end of the year 1913 was 21,908, an increase over 1912 of 569 miles. According to the 1913 statistics, the capital invested in the railroads of the country was $1,168,108,695. The number of passengers carried was 80,279,940, an increase of 7,067,856 over 1912, and the amount of freight transported was 43,038,082 tons, an increase of 4,168,278 tons over 1912. The receipts and expenses in 1913 were $137,255,165 and $86,289,835 respectively.

WILLIAM BARSTOW STRONG

William Barstow Strong, for several years president of the Atchison, Topeka & Santa Fe, whose death on August 3, at Los Angeles, Cal., was noted in the *Railway Age Gazette* of August 7, and whose portrait is given herewith, was one of the prominent pioneer railroad builders of the west. Beginning his railway work as a station agent and telegraph operator, he had worked his way up through the operating departments of the early western railways, the Chicago, Milwaukee & St. Paul, the Chicago & North Western and the Chicago, Burlington & Quincy, when in 1877 he was selected by the Boston interests which had begun the building of the Atchison, Topeka & Santa Fe to take the active direction of the extension of the road, which at that time had built up a system of lines in the state of Kansas, but which had hardly extended beyond the state.

Work had been begun on the line nearly 10 years after the charter was secured in 1869 under a congressional land grant which provided for giving the road 3,000,000 acres of land in Kansas on condition that the road was completed to the Kansas-Colorado line in 10 years from 1863. By the end of 1872 the line had been extended to Colorado and a campaign to populate the country with immigrants was under way. Several brief administrations had had charge of the property between 1872 and 1877, when Thomas Nickerson, who was president, and his Boston associates, put the property into the hands of Mr. Strong as vice-president and general manager.



William Barstow Strong

When Mr. Strong took charge of the property it consisted of 787 miles of line, nearly all in the state of Kansas. He became president in 1881, which office he held until 1889, and thus had executive charge of its affairs during the important period of its extension as a transcontinental system. When he resigned the presidency in 1889, the extreme termini of the company's lines were Chicago, Ill.; St. Louis, Mo.; Galveston and El Paso, Tex.; Deming, N. M.; Superior, Neb.; Denver, Colo.; San Diego, Cal., and Guaymas, Mex., and the mileage including one-half of all the lines owned jointly with other companies, was 7,118 miles.

This was also the period of competitive railway building and rate making on the western railways, and the affairs of the company passed through several exciting crises. When it was proposed to extend towards the Pacific coast by way of Raton Pass, N. M., and also into Colorado, a protracted contest ensued with the Denver & Rio Grande for possession of the mountain passes. This involved much litigation and some fighting by construction gangs. Mr. Strong's connection with the road as vice-president and general manager, with headquarters at Topeka from 1877 until 1881, was therefore during the most active period of the construction and development of this great property. As president of the road he had his office in Boston.

In 1889, on his retirement from railway service, he took up his residence on a farm near Beloit, Wis., near where he had first gone to work for the Chicago, Milwaukee & St. Paul. He served for a time as president of a local bank and was also identified with various other business enterprises. During the last seven years of his life he resided at Los Angeles, Cal. A brief sketch of Mr. Strong's railroad career was published in the *Railway Age Gazette* of August 7, page 266.

REMEMBER IT TO THE ROADS' CREDIT

[From the Chicago Evening Post]

After the railroad rate increase was denied in 1910 the roads comforted themselves with the thought that the fact would keep their employees from wage demands.

No so. Engineers, firemen, conductors, brakemen, yardmen and oilers struck successively for wage increases. And got all or a part of them.

Now, the 1914 rate decision denies the roads everything but a small section of their sorely needed increase in rates.

And despite this limiting of income the cycle of union demands for higher pay is beginning all over again. And the government which limits income is still doing nothing to limit the expense of labor.

On this briefly sketched background yesterday's action by the western roads stands out in something like its true proportions.

They assent to an arbitration that puts their own demands out of court, because the government of the United States asks them to. They could do no less, in view of the world situation.

But when war ends and the country can proceed calmly about its affairs, it should not forget that the railroads, unprotected by the government in wage matters, deliberately threw down their own protective wall for the sake of the general welfare.

The magnanimity of the act should make us the more eager to make regulation regulate *fairly;* to have it regulate the expense to which a road can be put when it presumes to regulate the income of that road.

FINANCIAL RETURNS OF THE HUNGARIAN RAILWAYS.—The returns for the Hungarian railways the first 10 months of 1913, show that during that period the gross receipts were $94,841,600, against $92,321,852 for the corresponding period of the preceding year. Passengers carried in 1913 numbered 147,020,000, as compared with 141,162,361 in 1912. During the 10-month period of 1913, 59,790,000 tons of freight were carried. The total gross receipts of the railways for 1913 are estimated at $112,665,000. This is an increase of about 1½ per cent, but the increase in normal years is usually from 3 to 4 per cent. During the year the railways expended $29,435,000 for the construction of new trackage and switches, stations, rolling stock, etc. There were 222 miles of new line built, making a total of 13,080 miles.

Fuel Economy on the Chicago, Burlington & Quincy

Outline of a Broad and Effective Campaign Conducted by a Committee Representing the Various Departments

By A. N. Willsie
Chairman of the Committee on Fuel Economy

The Burlington has a permanent fuel economy committee consisting of eight members who are officers that are educated in different classes of the service. The committee consists of two superintendents, one of whom has served in the train service, the other in the despatcher's service; two master mechanics, one of whom was formerly the air brake instructor; the chief architect, who is an authority on coal chute matters; the general storekeeper, who is an authority on the quality and cost of coal; the water engineer, who was formerly a special apprentice and is especially proficient in the drafting of engines and who also handles the analysis of water; and the chairman of the committee, who has held an official position both in the mechanical and operating departments. The chairman devotes his entire time to matters of fuel economy. The committee holds meetings at one division point at least every month, and matters pertaining to coal economy are talked over from every viewpoint. At these meetings the local officers are present, including the superintendents, master mechanics, trainmasters, road foremen of engines, roadmasters, master carpenters, chief despatchers, and also as many despatchers, engineers, firemen, conductors, brakemen, yardmasters and switchmen as are available, as it has been found that nearly every department can help to save fuel. The engineers and firemen, and the conductors and despatchers are requested to work closely together. Through the co-operation of the different departments a great deal may be accomplished in saving fuel.

The enginemen are instructed as to how they can save coal by co-operating with the firemen. This co-operation will permit of firing light and often, and will eliminate a great deal of unnecessary popping and smoke. The conductors and trainmen can make material savings by working quickly at stations, by not making any more switches than are necessary, by seeking to prevent hot boxes and, when they do get hot, by having the train stopped at a point where it may be started easily. The roadmasters and master carpenters can help a great deal by repairing defects which cause slow orders just as soon as possible and by seeing that the slow orders are removed as soon as the work has been done. Roundhouse men can help by doing the work reported by the enginemen and keeping the engines in good shape, especially by looking after the grates, keeping the flues cleaned, etc.

The operators and agents can assist by watching the block boards so that it will not be necessary to slow down or stop the trains, as each one of these moves consumes considerable coal. The agents can help by having their switch lists ready so the train crews may readily locate the cars that have to be handled. The conductor before leaving on the trip, is supposed to inform the engineer what work is to be done and at what points. This gives the engineer an opportunity to decide what coaling and water stations he will stop at throughout the trip. By both the engineer and conductor keeping in touch with the despatchers while on the road much more satisfactory plans can be made for making the trip. The despatchers can handle the trains better if they are advised by the individual crews as to what their intentions are.

Yardmasters can save coal by insisting on the switchmen having the hand brakes on the cars released when switching, by properly making up the trains in such respects as having the short loads ahead and putting as many short loads as possible in one train so as to avoid many trains stopping at the same station. The despatchers can help a great deal, not only by keeping in touch with the crews on the road, but by making meeting points at stations where it will not be difficult to start trains, by putting light tonnage trains on the passing track regardless of ruling direction, so as to keep the heavy tonnage trains moving, and also by having the operators open and close switches when it is convenient to do so.

In talking with engineers and firemen a great deal is said about light and frequent firing, the swinging of the doors in order to get good combustion, and especially regarding the unnecessary popping of engines, it being called to their attention that every minute of popping means a loss of 20 lb. of coal and that the biggest part of this can be avoided by careful work on the part of the engineer and fireman, and by their working in conjunction with each other.

Another saving in coal which is of considerable moment is made by the proper firing up of locomotives. It has been found that an engine properly fired up will have steam enough to move it on half the amount of coal that will be used by firing up improperly. Engines that are filled with warm water after having been washed out are fired up with from 300 to 825 lb. of coal, according to the class of the engine, and when cold water is used it requires about 1,200 to 1,400 lb. of coal for the larger types of engines. The despatchers' offices are instructed to give the mechanical department not less than two or three hours' notice when they want an engine. This gives the mechanical department a chance to do the necessary work on the engine and eliminates the necessity of having any engines held, fired up, subject to call.

Considerable attention has been given to the overloading of tanks. It is satisfactory to have the tank filled if necessary, but where it is not necessary, only enough coal should be carried to get the train over the trip safely. Particular attention is called to the tanks that are overloaded. This not only wastes coal at the chutes, but also along the road and that which falls off after leaving coaling stations is an absolute loss. There is also an element of danger from this latter feature, as falling coal is likely to strike some one near the track. It is estimated that the coal which drops around the chute and is allowed to lie there for some time before being picked up involves a loss of $1 per ton. This does not include the loss of the coal that falls off after the engine leaves the chute. A report was started showing the amount of coal picked up at the different coaling stations, and for the last six months of 1913 as compared with 1912 there was a saving of $2,286, and for the last six months of 1913 as compared with 1910, when the committee first began checking this matter up, the saving was $16,141. This is a remarkable saving, but, as stated above, it does not cover the saving that was made by stopping the coal from falling off the tanks after leaving the terminal.

On through passenger trains consisting of 9 to 12 cars the average pounds of coal used per car mile ranges from a little less than 9 lb. to 12 or 13 lb., according to the weather. With our heavy freight engines the pounds of coal used per 100 ton miles ranges from 8 or 9 lb. to 15 or 18 lb., according to the class of the engine and to the weather. Since the fuel economy committee was started a good showing has been made each year. The year 1913, as compared with 1912, shows that on the entire system the gross ton miles increased 6.57 per cent, the passenger car miles increased 2.64 per cent, while the tons of coal used increased only .13 of one per cent. On the lines west, where the daily fuel reports were recently put into effect, the gross

ton miles increased 2.65 per cent, the passenger car miles increased 3.87 per cent, and the coal used decreased 65,863 tons, or 4.5 per cent.

COAL RECORDS

The method of keeping coal records has been made as simple as possible, and at the same time as complete as is necessary. The engineer and fireman are required to sign a coal ticket when they receive coal from the chutes. This ticket gives the division, engine number, weight of coal, service of the train, train number, coaling station and date, and is signed by the engineer and fireman. The coal chute foreman forwards this ticket to the master mechanic. The only other reports the enginemen are required to make out are the regular time report and an engine mileage trip record, these two reports being on the same form, the engine mileage trip record being arranged so it may be easily torn from the time report and sent to the car accountant.

Form 4158.

ENGINE MILEAGE TRIP RECORD

.....191....

Train No. { .....Pass. From..... } MILES
{ .....Frt. To..... } .....
{ .....Work. Conductor ....

Switching at .....Frt.....Hrs.....Pass.....Hrs.

Engine No.....Engineer .....

Time Leaving.....Time Arriving.....

Light Engine From.....To.....Miles.....

Engine with Way Car only From .....To.....Miles.....

Double Headers { 1st Eng. No..... / 2nd Eng. No..... } From .....To.....Miles.....

Helping or Pushing From.....To.....Miles.....

Work Train Engine under running orders From.....To.....Miles.....

Work Train Engine under working orders From.....To.....Time.....

Road Switching, 1 hour or over, Name of Station.....To.....Time.....

Road Switching, 1 hour or over, Name of Station.....To.....Time.....

Light Engine Running from Depot to Round Houses, Miles.....

Doubling Hills, Miles.....Nearest Station.....

See instructions on front cover.

Fig. 1—Form Showing the Engine Mileage Trip Record

The information required on the mileage trip record is shown in Fig. 1.

An engineer's coal performance sheet is made out by the master mechanic daily and posted for the benefit of the men. In switching service the form includes the division, the number of the engine, switching hours, tons of coal and pounds of coal per switching hour, with the name of the engineer and fireman. For passenger and freight service the form includes the division, number of engine, number of train, miles run, number of cars or the total weight of the train, car miles or ton miles, pounds of coal per car mile or ton mile, hours on road, and the names of the engineer and fireman. The superintendent's office supplies the information regarding the number of engine, number of train, number of miles, number of cars or tons per train, hours on the road and the engineer's name, and the master mechanic supplies the rest.

A monthly individual record for each engineer is made out from the daily performance sheets just mentioned. This record contains the date of the month, the engine, train number, train miles, ton miles or car miles or switch hours, tons of coal, hours on the road, and fireman. At the bottom of this form the averages are given with the engineer's name.

A monthly report is also made out for switch service, which includes the division, the engineer's and fireman's name, the total hours switching, the total tons of coal, the pounds per switching hour and the cost per hundred switching hours. This form is sent to the superintendent of motive power, the information being taken from the form previously described. A similar form is made for freight and passenger service, the items here recorded being as follows: Division, engineer, fireman, total ton or car miles, average cars in train, tons of coal, pounds per car or ton mile, cost per car or ton mile, and average speed per hour. This is also sent to the superintendent of motive power for record.

In addition to these detailed forms a summary of the coal performance of all enginemen by divisions is sent to the superintendent of motive power on the form shown in Fig. 2. At the general superintendent of motive power's office these monthly reports are consolidated by divisions. The various items under the headings "Passenger," "Freight" and "Switch" clearly indicate what is required. Under the heading "Coal Used for Miscellaneous Service This Month" the items are credited as follows: For heating, a credit of 20 lb. of coal per car per hour is given; for lighting, 15 lb. of coal per car per hour. This part of the form is filled out by the road foreman of engines, so that during the winter all trains that are heated and lighted are given the proper credit. During part of the year some trains are not heated but are lighted, consequently the road foreman determines how many hours the engines furnish steam for recharging the batteries. The engineers are also given credit for the coal used in intermediate switching. This information is taken from the bottom of the engineer's trip report, and no allowance is made for any switching of less than one hour. Under the heading "Light Engine" is recorded the amount of coal used on engines running light to and from the shops, or when the engines are running light to get a train, or returning after being used on a train, the record being placed under the heading of freight, passenger, or switch, as the case may be. Under the heading "Helper" is recorded the amount of coal used by such engines used for double headers. Under the head "Pusher" is recorded the coal used on regular pusher engines over doubling districts. Under the heading "Work Trains" is recorded all the coal used in this service. Under the heading "Transfer" is recorded the amount of coal used on engines used in regular transfer service for which road rates are paid. Under the heading "Combination Passenger, Freight and Switch on Branch" is recorded the coal used on engines in short stub trains that handle both freight and passenger traffic at different local points.

The last form that has to do with the enginemen's coal performance relates to the monthly performance of each engineer and is placed on a form suitable for a loose-leaf note book for the road foreman of engines. This form gives the month and year, the performance, the average for the particular class of service the engineer is in, the run, and the date attention is called to poor performance. This record is supposed to be carried by the road foreman at all times so that he will be in a position to know what each man's average is whenever he meets him on the road. As stated above, daily reports are posted for the benefit of the enginemen. These reports are usually only one day old, and very seldom over two days old. This also gives the road foreman a good opportunity to keep in touch with the men, and to check up those making a poor performance.

There are four forms made out for keeping track of the coal used and received. The first form is a statement of the tons of coal issued by classes of service, made out from the engineer's coal ticket, as mentioned above. This form includes the engine's number and the amount of coal given the engine for freight, passenger, switch or work service. It also includes an inventory of the coal on hand at each coaling station, being made out the last day of each month, together with a summary which includes the following items: Coal on hand at end of last month; coal unloaded this month; total; coal issued this month; balance on basis of report; on hand as per inventory; and inventory over or short. This form is sent to the auditor of expenditures at Chicago, and is made out by the coaling station foreman with the

name of the station and the period which this report covers.

A daily report of coal unloaded is also made out by the coal chute foreman and sent to the general storekeeper. This form gives the date and number of way-bill, the billing station, the name of shipper, the initial and car number, kind of car, kind of coal, and whether the coal was handled on a tonnage basis or on a wage basis.

A third statement made by the coal chute foreman gives the daily coal statement for the master mechanic. This gives the division, coaling station and date, together with the coal unloaded, car number and tons, together with those engines loaded, giving the number of engine, the tons loaded, the train and the engineer. The summary printed on the same form gives the coal in the chute at 7 a. m. of the previous day and the coal unloaded during the past 24 hours, together with the coal de-

Burlington Route

Chicago, Burlington & Quincy Railroad Company

SUMMARY
COAL PERFORMANCE OF ENGINEMEN

_____ Division Month of _____ 191__

PASSENGER

PERIOD	Total Car Miles	Average Cars in Train	Tons Coal	Pounds Per Car Mile	Cost Per 1000 Car Miles	
This Month						Includes Misc'l Coal
						Excludes " "
Same Month Last Year						Includes " "
						Excludes " "
Last Month						Includes " "
						Excludes " "

FREIGHT

PERIOD	Total Ton Miles	Average Tons in Train	Tons Coal	Pounds Per 100 Ton Miles	Cost Per 1,000,000 Ton Miles	
This Month						Includes Misc'l Coal
						Excludes " "
Same Month Last Year						Includes " "
						Excludes " "
Last Month						Includes " "
						Excludes " "

SWITCH

PERIOD	Total Switch Hours	Tons Coal	Pounds Per Switch Hour	Cost Per 100 Switch Hours	
This Month					
Same Month Last Year					
Last Month					

COAL USED FOR MISCELLANEOUS SERVICE THIS MONTH

SERVICE	TONS COAL			Total Fireman	Junior Fireman	Per Cent Junior Fireman
	Passenger	Freight	Switch			
Heating						
Lighting						
Light Engine						
Helper						
Intermediate Switch						
Pusher						
Work Train						
Transfer						
Combined Pas., Frt. and Switch on Branch						
Total						

Fig. 2—Form Showing the Coal Performance of Enginemen

livered to engines as shown on tickets, during the past 24 hours, and the coal in the chute at 7 a. m. of the same day. From these figures the shortage or surplus is made up.

A monthly summary of the daily reports of coal unloaded for locomotive use is made up from the daily reports of coal unloaded, as above mentioned, for the superintendent of motive power. This report covers each division separately, giving the coaling station, the billing station, the number of tons under the various headings, egg, nut, etc.

These forms are the only ones used for covering the fuel situation, and have been found to work out very satisfactorily. The daily reports have been found to be conducive to good results, and are believed to create a certain amount of rivalry among the engine crews which materially aids in the economical use of fuel.

RAILWAYS IN TIENTSIN.—Since the rebellion in the summer of 1913, the service on the Tientsin-Pukow Railway has been improved, making it possible to reach Shanghai in 36 hours by the weekly express, and in 46 hours by the daily mail train.

GERMAN CRITICISM OF STATE RAILWAY MANAGEMENT*

Germany's state railroad system is an oppressive monopoly and a political mistake. Recently this view was expressed at three different industrial congresses, and in one case the indictment was backed by a two-thirds majority. This revolt against railroad nationalization comes just at the time when some Americans and Englishmen have begun to see in nationalization an easy, infallible way out of all railroad troubles. What aggravates the indictment is that it is mainly directed against the Prussian state system, which, of all railroad systems in Germany, is the most flourishing and efficient.

Every charge that is customarily leveled against corporation railroad ownership is now being leveled against the Prussian state system. The main charge is that the Prussian system makes for monopoly and restraint of trade. In committing—say critics—all the offenses which private corporations commit, the state knows no fear, for against it the public is doubly helpless, and there are no competing roads which can be used to bring the extortionate state to reason. Prof. Walther Lotz, one of the best authorities on railroad management, has just published a book on "German Communications Since 1800," in which he attacks the popular notion that state ownership prevents monopoly. German experience shows the contrary.

NOT A SOLUTION OF MONOPOLY PROBLEM

"Nationalization," writes Lotz, "is not by any means a solution of the monopoly trouble. Monopoly remains monopoly even if it is managed by officials. True, the state is claimed by nationalization enthusiasts to be a higher and unerring entity. But in reality the state is only the national organ of erring men, who are influenced by their virtues, their faults, their interests and their passions. And these influences are all brought to bear on railroad management quite as much when the state does the managing as when private persons do it. Indeed, in countries governed on party principles, privately owned railroads are often more bearable than state-owned railroads, as state-owned railroads are exploited as much as possible for their own advantage by changing parties." And referring to plans of railroad nationalization in foreign countries, Prof. Lotz adds: "This is a reason against nationalizing the railroads in the United States."

What is just now being said against German railroads mostly applies to Prussia. "German" railroads, owned by the Federal government, on the lines discussed in the United States, do not exist, except in Alsace-Lorraine. The system is railroads owned by individual states. The Prussian state, or strictly, the organization known as the "Prussian-Hessian railroad community" is the biggest owner, for it possesses 38,000 kilometers out of the 62,000 in the whole empire. Bismarck aimed at nationalizing railroads on federal lines, but his bill enacting this was defeated owing to opposition by the middle-German and south-German states. At present the only bond between the different state-owned systems is article 42 of the constitution which obliges the states to manage their roads in the general interest of the empire.

Many think that this splitting up is the cause of the defects of German railroad nationalization. Instead of being controlled by the democratic imperial legislature in the general interest, the roads are controlled by the state governments and state legislatures which nearly everywhere are on a reactionary and class basis. This is particularly the case with the "Prussian-Hessian railroad community." The Prussian government is narrowly conservative and agrarian. The Prussian Diet, elected on a narrow, property franchise, is the same. Prussian government and Diet policy is agrarian. It aims at sparing the landowners in matters of taxation, at encouraging the export of grain which is practically bounty fed; and also at encouraging export by the "schwerindustrie," an ally of the agrarians, which controls, on trust principles, the production of coal and iron. The interests

*Berlin correspondence in Springfield (Mass.) "Republican," July 19, 1914.

of the small trader and consumer are neglected. Prussia's railroads are governed in accord with this policy. She has low rates to favor the grain producer and the iron exporter; and high rates which hit the consumer on imported products.

RAILWAYS USED AS GOVERNMENT MILCH COW

A greater objection to Prussia's railroad system is that it uses its monopoly to accumulate vast funds for the state finances. This is considered a breach of sound railroad management and is a violation of a promise. Thirty years ago, during the era of railroad nationalizing, Prussia's minister of public works promised the Diet that the railroads would be run entirely in the interests of those using them, and not in order to make profits. "State railroads," he said, "are not a milch cow; they are not intended to be a source of state revenue."

He later promised that the railroad rates imposed would be only high enough to cover transport and maintenance and to pay a moderate percentage on the purchase debt incurred by the state. A similar promise was made in England in regard to the postal services, which were also not intended to help the state finances. Experience shows that governments are never able to keep such promises. The moment state finances run dry the state trading departments are resorted to as milch cows. Just as the English postal services are bringing in $25,000,000 a year to help the state finances, so the Prussian railroads are bringing in over $200,000,000 clear profit. This vast profit is 36 per cent. of the gross earnings, a proportion probably reached by no other railroad system in the world.

LARGE EARNINGS FROM EXCESSIVE RATES

Germans, who resent this system of exploiting railroads for gain, are not consoled by the fact that the $200,000,000 goes into the state, not into private, pockets. They object that the $200,000,000 is not equably imposed as a tax on all classes according to wealth. It is taken mainly from the nonprivileged classes, on whose traffic the railroad administration imposes heavy transport rates, while the roads carry the landowners' corn and the iron magnates' metal at very low rates, or even, as is suspected, at a loss.

The account books of the "Prussian-Hessian railroad community" for the past 30 years reveal how the state railroads have acted as milch cow for the state treasury. Between 1882 and 1912 over $1,250,000,000 has been taken out of the railroad profits and handed over to balance the state budget. This transaction is made possible by the fact that the $200,000,000 annual profit is far more than is needed to pay interest on and amortize the railroad debt. The profits amount to about 7⅜ per cent. on the railroad debt. But the railroad debt was borrowed at about 3½ per cent. Of the original railroad debt of $2,875,000,000, $1,085,000,000 is in consols, of which nearly all bear 3½ per cent., but a small portion, 4. The state with its 7⅜ per cent. from the railroads makes on this money a clear profit of nearly 4 per cent. The rest of the capital comes out of the "railroad extraordinary fund" and the "disposition fund," against which no interest-bearing consols are issued; and on this portion the state puts in its pocket the whole of the 7⅜ per cent. earned.

In the matter of profits the state's appetite grows. Twenty years ago it was content with 5½ per cent., which put a clear 2 per cent. in its pockets. When this caused objections, the government pleaded that, owing to the bad condition of the state finances, it could not do without the 2 per cent.; but it promised faithfully that the milch cow process should go no further. If profits, it said, showed signs of rising still further, they would be cut down by means of a general rate reduction. Despite this promise, profits were allowed to rise by yet another 2 per cent. on the capital invested; and the rates remained practically as before. This enormous profit did not result from management efficiency. Judged by American standards the management is not efficient. The ratio of expenses to receipts has steadily risen. The profit is due entirely to the vastly increased traffic, the carried freight being about 2½ times greater than it was 20 years ago.

In addition to subsidizing out of railroads the ill-balanced state finances, Prussia has created from the same source a vast state property. This is shown by the railroad capital account. The railroad administration has written off an excessive amount of the original small capital outlay of $2,875,000,000. Altogether $750,000,000 has been amortized. So that of the original railroad debt only $2,125,000,000 remains outstanding. This judged by European values, is a ridiculously small capitalization for 38,000 kilometers, nearly all double, treble, or even quadruple tracked, and splendidly equipped. As a fact, the present sale value of the state railroad system is appraised at $5,200,000,000. The increase in value is due to the putting back into the roads of part of the profits; to extensions built out of profits; and to the natural rise in land and other values. The difference between the outstanding capital debt of two billion dollars odd and the present value of five billion dollars is the profit and property of the state.

HIGH RATES A TAX ON BUSINESS

If the state were a private corporation it might point with pride to this result of 30 years' ownership, but the public would complain and threaten, and ask why a railroad earning 7½ per cent. and in addition creating out of profits capital values of three billion dollars did not reduce its rates? That is the complaint in Prussia. The state, say the complainants, should cut rates heavily; it should be content with the 3½ per cent. which it itself must pay to borrow capital for railroad construction; and if its finances suffer, then let it mend them by imposing property taxes. The high railroad rates tax, not property, but business; and they tax heaviest the businesses which can stand it least.

The complaint is reinforced by the charge that the roads are not efficiently managed. Reichstag Member Gohre said that the state might cut rates heavily and still pocket its 7⅜ per cent. if only it economized in management. Herr Gohre further showed that the roads are badly overofficialized. In the Cologne chamber of commerce it was stated last year that, counting passengers and train tons carried, the Prussian roads have 2½ times as many officials as the American roads; and that they have five times as many clerical and other officials who do no physical work. "The bureaucratic management and the excessive staff would not," the speaker said, "be tolerated by a private corporation."

RATES NOT ADAPTED TO COMMERCE

Most persistent of complaints is that the rates are fixed by bureaucrats who do not understand business; and are taught by their superiors that the rates should favor grain and iron exporters at the expense of other interests. Bismarck had a plan for letting the Diet fix the rates. This plan was not carried out. The rates are fixed by a nominated railroad council of state officials.

This railroad council invites the co-operation of representatives of the business interests; but the representatives are only advisers and have no decisive vote. The interests, however, bring sufficient pressure to push their points against nonrepresented interests. The chief of the railroads, Minister of Public Works, Breitenbach, ascribes to this the high rates. He says that the interests themselves, in their zeal against competition, have prevented a reduction. Minister Thielen, a predecessor, said the same thing. He described the roads as "a morsel between contending dogs for which there is no parallel even in America, where the trusts exploit the roads in their own interests."

Critics emphasize this weak side of railroad nationalization. They say that where roads are privately owned the rates are invariably controlled by some public authority, and this public authority is in turn controlled by the legislature, whereas in Germany the vital matter of rates is withdrawn from the legislature and handled by a handful of uncontrolled bureaucrats.

Story of the South African Railway Strike*

The Causes, Extent and Lesson of the Walkout on the Government Lines Which Was Terminated by Martial Law

By a South African Correspondent

The people of the United States frequently are threatened with serious railway strikes. Some people in America advocate government ownership as a means of eliminating the danger of such strikes. Some railway employees favor government ownership as a means of preventing the development of the conditions whose existence under private ownership they regard as justifying them in striking.

The railways of South Africa are owned and operated by the government. There was a serious strike on them in the early part of the present year, which was speedily crushed. While this occurred some months ago, a fuller narrative of what occurred than has been published in your country may yet be interesting to, and certain food for thought for, the railway officers and employees of the United States and all other Americans who are interested in the labor problems presented on railways, and especially in the form they may take, and the way in which they may be dealt with, under government ownership.

The South African railway strike was not extensive, involving only about a tenth of the railway staff. It was not prolonged, lasting just over a week. It was not destructive of either life or property, being on the whole free from riot. But it was certainly instructive. It taught many a valuable lesson, pointed many a far-reaching moral. It demonstrated, what in South Africa had previously been uncertain, that as a weapon for securing industrial redress the ordinary or passive strike has greater limitations than the ballot box, and the Syndicalist or violent strike, as great limitations as the ordinary strike.

To arrive at the whole truth is probably now impossible, and to arrive at even an approximation of the truth necessitates going back to six months before the railway strike, and considering the general industrial unrest with which the railway troubles were inextricably mixed, and from which the railway strike arose.

Origin of the Controversy

Rand, means ridge, and is the term applied to the gold-bearing ridge or reef extending for 40 miles along a line of which Johannesburg is the center. Along this ridge scores of gold mines are situated, the annual gold output of which is valued at about thirty-eight million pounds sterling. On one of these mines, in May, five underground mechanics had their Saturday shift increased by three hours, refused to work the extra hours, and were dismissed. Their society took the matter up, prohibited other mechanics from replacing the dismissed, and began negotiations with the management.

After a while it was pointed out, wrongly as it now transpires, that the company had really broken the law, that a month's formal notice of the intended change in the five men's hours should have been given. Thereupon the management undertook to go back to the old hours, and to reinstate its men, but did so with the usual stiff-necked ungraciousness which more than anything else perhaps irritates and makes employees unreasonable. Had the employees been sensible they would not have stood upon the manner of their going back to work, so long as the going was advantageous. Instead, however, of setting employers an example of how not to act reprehensibly, the strikers now acted as waywardly as the worst employer could. They now asked, not only that the five men should as hitherto cease work at 12:30 p. m. on Saturdays, but that all workers who previously had worked to 3:30 p. m. should in future cease at 12:30; that instead of the eight-hour day being calculated from the time a man started work till he left it, even when he had to waste perhaps an hour waiting to be lowered or raised from the pit, the time should be calculated from the time he entered the company's gates till he left them; and that disputes should be discussed not by spokesmen elected from the men, but by better practiced, more competent, less fettered spokesmen chosen from the trades union.

If the men had before been inconsistent and unreasonable, the management now was no less so. The issues were no longer confined to one mine and its employees, but affected all the mines and all their employees. When in disputes with their employees, as in this dispute the mine owners avail themselves of the best collective consultation and co-operation, the men, it seems only logical, should not be denied the opportunity of availing themselves of the best consultation within their reach. But this the mine owners insisted the men should not have. They elected to regard the trouble as purely a domestic quarrel between themselves and their employees. They could not, they suddenly conceived, allow third parties, such as trades union officials, to meddle in the matter. The men's trained negotiators being, so to speak, put out of court, a deadlock was arrived at. It was no longer possible to negotiate. It was like leaving a prisoner in the dock and expecting him to take up his case where his ejected barrister had left it. Industrial arbitration courts, though they have in instances notably failed, have in other instances been useful. They might have patched up peace in this case. But there are no such tribunals in South Africa, so the contest of alleged reason degenerated into what avowedly was purely a trial of strength. The workers called a general strike. The mine owners retaliated by employing strike breakers.

Only one outcome was to be expected. Collisions had previously occurred with some frequency. Now the strike assumed forms of unprecedented violence. Private dwellings were burnt. Women and little children suspected of dependence on strike breakers went in danger of their lives till given police protection. Where argument failed, the pick-handle and the dynamite stick were employed. Anarchy was sweeping over the Rand, and ended, as we have said, in turning Johannesburg into a shambles. Syndicalism was abroad.

The position of the government was awkward. A military change had been designed, whereby the defenses would pass from the Imperial troops to the citizen forces of the country. The authorities were, however, in the middle of their arrangements when the industrial trouble broke out. The police forces, excellent in ordinary times, were inadequate in such an emergency, entailing as it did the defense of millions of pounds' worth of machinery. So for a day or two the Rand fell to the mob, and the Imperial troops in the outer districts had to be called in. The government had, of course, long before this intervened between the strikers and the employers. Cabinet ministers, in the thick of the fight, hurried as fast as their motor cars could ply between the headquarters of the hostile camps. At last, on July 7, both sides realized that continuation of the struggle would mean ruin to all involved in it and gain to no one. A truce was patched up, the terms of which were exactly those which, with patience and clear judgment, could have been contrived when negotiations betwen the disputants first ceased. Certain minor concessions were granted right away; the rest were to be referred to an impartial commission. The strikers were to resume work without victimization, and as they would not tolerate the strike breakers, and as the mine owners would

*The writer of this article is a resident of South Africa who was so situated as to be closely in touch with all the developments narrated.

not break faith with these, they were compensated to the tune of £50,000; and of course the men's union had won the recognition they contended should never have been denied them.

AGITATION BEGUN BY RAILWAY EMPLOYEES

The truce with the miners brought no lasting peace; the railway men immediately entered upon the scene. The secretary of their amalgamated society said they had been groaning under grievances for years, and now was the time to strike for redress. What had been done by the mine workers on the Rand could be done by workers generally all over South Africa. They must organize for a great general strike. In future the railway society would act with the Federation of Trades.

Prior to 1910 the separate colonies of the Cape, Transvaal and Natal had each its own legislature, its own state railway staff, its own fluctuations of prosperity, and consequently different standards of pay. However much the emoluments, for instance, of the average station master in the Cape differed from those of his equivalent in the Transvaal, they were on the whole fairly consistent with what other average station masters in the Cape drew. And so through all the grades. Were a man not receiving what, perhaps with an exaggerated sense of his own worth, he believed his due, he had the comfort of knowing that neither were his colleagues. It was not till the colonies united, and the three railway services became one; not till men from different provinces found themselves working *together,* on the same work, but on very different rates of pay, that anomalies became apparent. Hence a certain unrest throughout the service. The railway society, however, represented more the artisan than the clerical grades. It was, therefore, more to questions of hours, piece work, overtime and minimum wages, than to questions of what should determine seniority and promotion, with which it concerned itself; and in the end the issue on which the strike was fought was the clear one of whether or not the administration should retrench when it thought fit.

The railway society, as stated, was not affiliated with, though it co-operated with, the general trades societies; in the July truce no provision was therefore made for railway men. And as they were state servants the government was not able, as in the case of the miners, to act as mediator between employers and employees. The railway men were, however, instructed to formulate their grievances, and informed that, like the general workers, they should have an impartial commission of inquiry. They asked that the unanimous recommendations of a previously appointed Grievance Commission should be adopted; that the railway society should be recognized; that an eight-hour day should be general throughout the service; that the minimum wage for white employees should be eight shillings a day; that piece work should be abolished; that the salaried staff should be better paid; that a permanent inquiry board be appointed; that punishment for striking and making mistakes in train running be less severe; that equal representation on the present appeal board be given the men; and *that the new Union staff regulations be suspended.*

Before the two commissions could sit, many preliminaries were necessary. Almost daily negotiations between the government and the general workers' and railway men's representatives took place. Unfortunately, a hitch occurred. The representatives of the general workers pointed out that their men were dissatisfied with the truce, were not disposed to be bound by the undertaking given to government. The breach widened. There was a feeling that the July events had given labor the ascendency, and that whereas previously they had to beg now they could compel the terms they wanted. There was probably a mutual distrust of the honesty of purpose of either side. However, this may be, a deadlock soon arose. A general strike, it was declared, would be called—when it suited the workers.

Negotiations between the government and general workers thereupon ceased, but the government was prepared to continue with the appointment of the promised commission, and asked labor to assist in the inquiry. Labor, however, professed itself unable either to have anything to do with the election of commissioners or to recommend witnesses to give evidence.

The railway society, however, could not prevail on the railway men to throw constitutional methods to the winds. So the promised strike was postponed. But it hung like a threat over the community. The election of the railway commission, to consist of a judge of the Supreme Court, a government nominee, and a member elected by the men, was proceeded with. Meanwhile the government had been considering why, as it had negotiated with the railway men's accredited representatives, it could not recognize their society. It was decided the society would be recognized on condition that its constitution was redrafted to provide that it should not be a political organization, that it should be composed only of railway and harbor servants, and that it should in no way be associated with outside organizations.

RAILWAY EMPLOYEES AROUSED BY FALSE RUMORS

This was under discussion, and matters were progressing not perhaps without obstacles, but on the other hand not without hope of peaceful settlement, when suddenly on October 8 the press alleged that a number of railway men were to be dismissed. Estimated railway revenue, it was announced, had not been realized; expenditure had far exceeded expectations, largely through increased increments to staff; recent industrial disturbances had so unbalanced trade that the future looked dark; and some retrenchment was necessary.

Loud and vehement came the retort that this was victimization; the railway men had dared to assert their claims, now they were to suffer for their temerity. Revenue, it was urged, might have fallen; it was bound to fall when by recent rate reductions the earning power of the railways had been reduced by nearly a million pounds a year. But trade, the critics contended, remained good; the tonnage had not appreciably decreased; the railways were as busy as ever; overtime was plentiful: then why dismiss men? The minister of railways explained that the rumor had been premature and exaggerated. Expenditure and revenue were, indeed, being watched. Officers had been asked for recommendations as to possible economies. It was always, and at present more than ever, necessary to consider economies. But there were other ways of effecting economies besides dismissing men. The railway board was considering what should be done. A decision could not be arrived at for some time. But if men had to be dismissed, nothing like the number rumored would go.

The railway society was, however, suspicious. It appointed a deputation to ascertain from the minister exactly what was intended. The minister replied that he was prepared to receive a deputation of railway men, but as the conditions on which the government was prepared to recognize the railway society had not yet been complied with he could not receive the officials of the society. The latter were indignant, and feeling deepened as a rumor got abroad that not only was retrenchment contemplated, but that it had already started. Men in Johannesburg, it was affirmed, who had been prominent in the July events, had already been dismissed, and labor leaders, it was further stated, were itching for an immediate general strike, if the railway men would come out.

The minister repeated and amplified his statement, this time direct to the staff, pointing out that the men were casual employees, engaged on short contract and subject to 24 hours' notice; and were among those employees who in a huge concern like the South African Railways are continuously being dismissed or engaged as the exigencies of a fluctuating traffic necessitate. He could guarantee there would be no victimization, and indeed there was nobody to victimize, as the staff as a whole had been loyal during July, however wild the utterances of the officials of their society; but he could not guarantee that retrenchment might not become necessary, because he could not anticipate the future.

This relieved the position. In a public pronouncement the railway society informed the press there would be no strike.

The crisis was over. The unrest had died down. The position was normal. So matters continued till Christmas. Then just towards the close of the year rumor dropped another bombshell among the smouldering embers. Large numbers of railway men, it was alleged, were being dismissed; five hundred had been scheduled for that purpose; no reason was assigned for the sudden and drastic action; this was the administration's Christmas box to those who had been foolish enough to trust.

The answer was that only 70 men had been dismissed, and that these were temporary employees. Even this, it was retaliated, was unendurable. There was no need for dismissing men. The railway society demanded that retrenchment be stopped, that those discharged should be reinstated, and that a definite guarantee be given that no further retrenchment take place: these demands to be granted by January 7, otherwise a strike would be called.

It was impractical the answer came, to reinstate the 70 men, even if sufficient reason were adduced, as the dismissals had been decided upon by the Railway Board after the most careful consideration. It was impossible to give a guarantee that future retrenchment would not become necessary. And it was preposterous to demand that the Railway Board should abdicate its functions at the dictation of an irresponsible and officially unrecognized society. But if, in anticipation of further retrenchment, the staff had any specific practical suggestions for distributing the burden more equally, by temporarily reducing wages or hours generally, the government was prepared to consider such suggestion. None was made.

It is perhaps inevitable in a huge concern like the South African Railway, even had Union not brought a crop of still flourishing anomalies, that anomalies should frequently arise. Perfect equity is hard to attain even in small affairs. Officials controlling men are not all ideally fitted for the task, are not always in that balanced, temperate frame of mind which men controlling the destiny of another man, however humble the latter, should preferably be. Injustices, therefore, no doubt occur. This is true not only of a railway but of all businesses. But on the South African Railway there is machinery to check this as far as may be. There are impartial appeal boards on which representatives of the workers sit. It is no doubt laborious, it is often discouraging, for an individual, especially a workman with little education, to fight a lonely battle through to the board. A society of his fellows to help him along is then useful, to men and to the government, if it helps to secure equity and content. But the object of the society should be to enable men specifically to present their grievances. The society should not truculently insist on the random granting of what a man asks for merely because he asks. Much less should it do so in the case of an indefinite number of unspecified men. Yet this is what was done, and this is what was wrong. Every charge leveled by the railway society against the administration was vague and unsupported by evidence.

On the South African Railways every man is employed on specific conditions. He knows, or should know, what those conditions are. He may be subject to 24 hours' notice, or to a month. He may, if his services be dispensed with, be entitled to a pension, to a gratuity, or to nothing more than the wage for the time he has worked, according to the terms of his contract. These are his rights. These rights he is entitled to insist upon. And as long as they are respected he has received justice and is entitled to nothing more. For the South African railway man to expect more, is to assume that a government railway is a benevolent institution, not a business concern, which is untenable.

It is perhaps true that whereas a private employer, in theory at least, considers only his own pocket and the exigency of the moment, a government employer should take a wider view; should consider whether in retrenching a man, especially in a country like South Africa, where there are few commercial openings for railway men, the saving to the railway is not less than the burden of unemployment thrown on the country. But if this is a consideration it can weigh only when by parliament it has been laid down as a definite principle to be practiced; and then if the railways are to continue to be run on purely business principles, there must be some arrangement for repaying them from general revenue for the losses which such unbusinesslike principle would entail. Until such arrangements exist, it may be politic, in times of acute industrial unrest, to waste wages on men not required rather than precipitate a strike and bear the consequent expense; or it may not be politic. That is for the government administration to judge, and if in the opinion of labor it judges wrongly, it is for labor, by constitutional means, to get redress through parliament, not to try to overawe the administration. For while strikes and their cost are to be avoided if possible, there is an even worse evil to avoid, and that is the evil that would result from the belief that not the exigencies of the service, but the dictates, the often preposterous dictates of the railway society, is what shall determine the policy of the administration. Strikes are bad. But for a moment to admit that the railway employees, not the Railway Board, should decide when and what men shall be dismissed, is obviously preposterous. It strikes at the root of all discipline. It may be a modern, but it is a silly notion. If in times of depression the Railway Board elects to consult its men for suggestions as to economies that may avert the necessity for dismissals, well and good. That is an act of grace conceivably beneficial to both parties. But to contend that the Railway Board should be responsible for the capital and interest on the £80,000,000 invested in our railways, whilst its economic policy should be dictated by an irresponsible and largely uninformed trades union, is to advance a theory the acceptance of which would be more ruinous than the worst strike ever engineered.

Yet this is precisely what the railway society demanded. Unless the temporary employees dismissed were reinstated by January 7, and unless a guarantee were given that no more employees were dismissed, a general railway strike for January 8 was threatened; with the further proviso that if at any time the railway society could lay its hands on 25 orders of dismissals, it would call a strike. The society claimed that it had the support of 90 per cent. of the railway men; it professed to be able to bring the whole railway service to a standstill in a day, in both of which estimates subsequent events proved that the society was ridiculously mistaken.

Thus the issue in the South African industrial unrest became a railway one. The Federation of Trades decided to support the railway men, and if necessary to call a general strike of all trades, but this latter necessity, it was at first believed, would not arise, as if the railway men struck successfully the mines would soon have to stop for lack of coal.

RAILWAY STRIKE CALLED

It was then seen that the organization of the railway society was bad, that its optimism was ill-founded. The strike was called. In the most turbulent centers, Johannesburg and Pretoria, the response was fair; but not as satisfactory as was expected; many men continued to work, and the administration succeeded in running a number of its trains. At important centers like East London the men demanded a ballot before they would strike. Uitenhage was unwilling to come out. Kimberley voted against a strike. Capetown refused to strike. Bloemfontein was shocked at the executive's precipitate and unsanctioned action.

On the other hand, the government was prepared. It had profited by the experiences of July. The new citizen force was now in existence, and so excellent were the arrangements that within a few hours armed men and munitions were pouring into the disaffected areas. The stations, the railway line, and those who elected to continue working were from the first obviously assured of adequate protection. There was no opportunity for "pulling out," no opportunity for rioting; order was firmly maintained.

On the 9th, however, the Cape mail was dynamited, luckily

with little damage, and of course heated speeches poured in torrents. On that date several of the strike leaders, including the secretary of the railway society, were arrested under the Peace Preservation Act. This action gave an impetus to the strike. The running staff came out in increasing numbers, loyal drivers refused to carry armed men to the Rand, there was a feeling that the government had been needlessly autocratic, and to show their resentment increasing numbers of men in outside centers, especially Durban and Salt River, went on strike.

The Federation of Trades, indignant at the arrest of the strike leaders, and piqued perhaps at the fact that foodstuffs and coal for the mines continued, by extraordinary exertion on the part of the authorities, to be brought to Johannesburg in quantities at least sufficient to prevent acute distress, decided to take over the control of the strike, and to call a general strike of all trades. Meanwhile several unsuccessful attempts had been made to blow up the line. The train services in the Free State, Natal and the Cape were practically unaltered, but in the Transvaal only a limited service could be maintained.

GENERAL STRIKE ORDERED

On January 13 the general strike was called, and the government retaliated by declaring martial law in the centers most threatening. The strikers formed bands to prevent their sympathizers being carried away by excitement, the towns and suburbs were parceled out for military control, committees to supervise the distribution of food and fuel were formed to prevent extortion, and from every part of the country men of all kinds volunteered for whatever duties the government elected to give them.

Thereupon the train service in the Transvaal improved, only a tenth of the railway men were out, the others, certain of protection, followed their inclinations unmolested, and the strike began to crumble. Regrettable events, blunders on the part of the martial law authorities, and blunders on the part of the strike leaders occurred, several arrests were made, much ill-feeling was caused; but there was practically no bloodshed, no destruction of property, and very little brutality of any sort. The iron hand of martial law was too strong for that, and the great tragedy passed off without any of the atrocities which characterized the events of July.

By January 15 the outcome of the strike was certain. Comparative quiet reigned in the worst centers. Fortune, it was clear, was against the strikers. By the sixteenth there was a rush for reinstatement. The surrender was unconditional.

But, however satisfactorily to the public the strike had terminated, the country had suffered heavy monetary loss. It was, in the opinion of the government, impossible to face a recurrence every six months, to have the business of the country upset and its credit prejudiced whenever a few irresponsibles, who as events proved had not the support they imagined, elected to inflame passions and call a strike. So nine of the ringleaders were deported. They were, the government claimed, the enemies of South Africa, "declared by themselves, and declared by their acts." And Parliament, taking that view, has just passed an indemnity bill confirming the action of the government.

But the money and trouble entailed by the strike has not been entirely wasted. Whatever grievances there were have not been removed, but it is the intention to continue with the commission the inquiries which automatically stopped when the railway society's secretary, who was one of the commissioners, was deported. And as now the railway men appear to realize, that however excellent their case, the ballot box, constitution and constructive measures generally are the most likely to prove useful where strikes have proved useless, there is reasonable hope that we are nearer than ever to a solution of our industrial difficulties.

Only about 3,500 railway men went on strike. As previously stated they acted illegally in leaving their work without due notice, and, speaking strictly, those who had pension or other accruing rights had forfeited them. The majority were, however, allowed to resume work.

Finally it should be mentioned that since Union in 1910 the increments to the South African railway men have been increased by over £681,000 per annum, and in many ways the administration has done much to improve the conditions of the workers. But conditions of working have become much more complex and staff complexities have naturally increased proportionately.

LOCOMOTIVE STAYBOLTS*

BY C. A. SELEY†

The cost of repairing a broken staybolt, even if the work can be combined with other necessary work, is not simply that of the labor and material employed, but also some portion of the value of the service of the engine which is lost thereby, and if the actual costs of staybolt maintenance and other matters incident thereto were closely computed, very good reasons for means of improvement would be manifest. Not that improvements have not been made. The iron makers have been diligent in producing special staybolt irons that have more lasting qualities to stand the peculiar requirements of that service. By the use of special mixtures and methods of piling and working, special brands of iron are produced which give very excellent results, but the breakage of solid staybolts has not been entirely stopped by such means.

With a well-designed and well-built boiler equipped with solid staybolts, there should not be serious staybolt trouble until about the third year of its use. In other words, the solid staybolt in modern, well-designed boilers, is from 50 per cent. to 75 per cent. perfect, based on 100 per cent. being the life of the average firebox, which is now about 5 years.

Experiments have been made showing the relative expansions of the firebox and the outer boiler sheets when under pressure, proving they are not alike, and therefore the staybolts, in addition to the tensile load imposed by the pressure, have also an angular strain due to these irregularities. It is these angular movements many times repeated, that account for broken staybolts, for the direct pull is taken care of by a relatively high factor of safety. In proof of the latter statement assume staybolts with ⅞ in. diameter at smallest portion, spaced 4 in. by 4 in. in a boiler carrying 200 lbs. steam pressure. Each bolt support 16 sq. in. and a consequent load of 3,200 lb. The bolt area is .60132 sq. in. and the above load is therefore 5,320 lb. per sq. in. As staybolt iron has generally not less than 48,000 lb. ultimate tensile strength the factor of safety exceeds nine. This proves the undesirability of large staybolts, as with large sizes there is an increase of rigidity, whereas the desirable feature is flexibility.

It seems clear that they do not break on account of lack of strength of the cross section, but on account of the overstressing of the outer fiber due to angular vibration, and it might be well to theorize as to when the initial check or break in the outer fiber occurs. Reference has been made to tests showing angular movements of sheets and staybolts under pressure, but it is likely that these do not produce the extreme movement which may account for the initial check or failure of the outer fiber, which progresses gradually inward and results finally in complete fracture. Reference has been made to the irregular temperatures of the sheets, produced by rapid and uneven heating of the firebox in firing up, also in cooling down and washing. It is believed that at these times the angularity is greatest and is accountable for the initial checks, although at these times there is no pull on the bolts. After water circulation is well started, undoubtedly the amount of angular movement is greatly reduced, although remaining in some degree, but the damage has been done, the check started and in course of time evidenced by the complete fracture.

Now, what is the remedy? More flexibility of the body of the bolt between the sheets to reduce the stress on the outer fiber

*Extracts from a paper on "The Art of Locomotive Staybolts," presented at the April meeting of the New York Railroad Club.

†President, American Flexible Bolt Company.

so that the initial check will not occur, and also reduce their strength as levers to punish the firebox material, reduce the buckling and save the fireboxes. It is manifestly impossible to correct the handling of engines at terminals so that these irregular temperatures and stresses will be done away with. Availability of power is the first consideration and terminal forces are under extreme pressure to get engines turned in the shortest possible time, and engines which they are not in a hurry for get the same treatment generally in respect to the matters which contribute to staybolt breakage and firebox cracking.

Recognizing the necessity of meeting the situation and demands for availability of power, many railroads have installed improvements in washing out which contribute materially to that phase of the question. Bright minds have also been at work on the staybolt structure and some very meritorious designs have been produced, but generally at considerable increase over the solid bolt, both as to first cost and application cost. The importance of the necessity for extension of staybolt life and increase of locomotive availability, will, however, justify increased cost, the degree of which being dependent upon conditions. Owing to staybolt breakage occurring generally close to the outside sheet, the earlier attempts to secure flexibility of the staybolt structure in this country were to change the outer end to a ball and socket form, which gave complete and absolute flexibility at that end. This idea originated on the Pennsylvania Railroad, and is in extensive use there and elsewhere at the present time and has served as the basis of subsequent modifications and improvements of the various staybolts of that type and which are generally and commercially known as flexible staybolts.

One of the more recent developments in the art aims directly to increase the flexibility of the body of the staybolt to eliminate breakage and also save the firebox sheets by the simple expedient of making staybolts with a body of two pieces of half-round iron, thus having two neutral axes, each much closer to the outer fiber than in the solid section, and then by twisting the body present the plane of greatest flexibility in every direction in which a lateral stress may come to it. The ends of these bolts are larger than the body and take the usual staybolt thread, and are applied to the boiler in the same manner, and at same cost as that of solid bolts. As they have a relative flexibility of body several times that of solid bolts of equivalent cross section, it is reasonable to believe that the outer fiber stresses have now been reduced so as to give such bolts a life of three, four, or half a dozen times that of solid bolts, and it can be reasonably expected that these bolts will last the life or more of the average firebox, and more than that is unnecessary, an economic feature of importance.

As a general proposition, it pays to use the best, and this applies particularly in locomotive maintenance and availability. Analysis shows that it costs about two dollars to apply each dollar's worth of material purchased for a railroad shop, but this is probably too low in considering the relative cost of material for staybolts and their application, particularly in breakage renewals. The costs for cooling down, emptying, stripping, removal and replacement of the broken bolts, and the other parts involved, together with the loss of time of the engine, makes the material costs insignificant by comparison. If the causes which contribute to staybolt breakage, are also responsible for the early failure of fireboxes a railroad could almost afford to use gold staybolts, taking all the factors into consideration.

Brazilian Railway Development.—A recent statement by Senhor Hermès da Fonseca, the president of Brazil, says that the railway system of Brazil was increased in 1913 by 1,431 miles, bringing the total up to 15,280 miles. Of this total 2,188 miles are operated by the federal government, 5,728 miles are leased by it to individuals, 3,454 miles have been "conceded" by the federal government to private enterprise and there are 3,903 miles which have been conceded by the different states.

BUSINESS PRINCIPLES AND RAILWAY MAIL PAY

The Railway Business Association has issued the following statement on the railway mail pay question:

Proposals for readjustment of railway mail pay now pending before Congress involve such serious divergence of view as to facts and as to principles of fairness that the attention of business men is invited to the situation. As business men we submit:

1. The government dealing with a company which cannot refuse to deal should not permit the price to be fixed by an official who has a balance sheet stake in making the price low.

2. The government should not force upon a railroad a contract which no business house would accept, under which the quantity of service to be rendered is estimated in advance by the purchaser, the pay to be determined by that estimate and service in excess of the estimate to be performed but not paid for.

3. Congress should not confuse the consideration of mail pay, a purely economic and business proposition, with political and irrelevant questions such as are involved in the Moon bill and which would draw in a large number of persons interested in its passage wholly apart from the question of pay.

4. Congress should not act on mail pay until it has the report of the Joint Committee of Congress which has been investigating this subject for two years, or at all while engrossed in an unusually large legislative program.

The Moon bill in constituting the postmaster-general the arbiter as to price ignores a fundamental principle of business fairness.

The buyer, in business, fixes the price, but the seller can refuse to deal. The railways cannot refuse to deal. Mail carriage is made compulsory by the Moon bill under heavy penalties. To attain perfect impartiality the umpire should be connected neither with the railways nor with the public. This being impracticable, the power should be exercised by an authority farthest removed from temptation to be overzealous for low pay. The postoffice department is more interested than any other government body. One test applied to postoffice administration is the size of the deficit. There is in mail administration so much that is personal or political that postoffice officials are under undue temptation to bias.

How this works is plain from the record. Postmaster-General Hitchcock stated in House Document No. 105, dated August 17, 1911: "The committee (of postoffice department officers) estimates that through a readjustment of railway mail pay on the basis of cost with 6 per cent profit a saving to the government could be made of about $9,000,000." This estimate, assuming the fairness of cost plus 6 per cent, gave the public the impression that the postmaster-general had declared the roads to be overpaid by $9,000,000.

Congress in 1912 provided for a joint committee before which the railroads emphasized that the method of finding cost omitted allowance for interest on investment.

The postoffice department on January 16, 1914, proposed "to allow such additional amounts as may be necessary as shall render the whole a proper proportion of a fair and reasonable return on the value of the property necessarily employed." Thus the department investigation had been conducted without co-operation of the railroads, although they had offered co-operation, and an estimate of $9,000,000 over-pay had gone to the country before the railways had had an opportunity to point out this vital omission which was subsequently acknowledged by the department.

The department contends that the roads ought to perform government service at a lower rate than private service. Postmaster-General Burleson says: "The carriage of the mails by the railroad companies for the government cannot be considered as of the same character of service as that performed by them as common carriers for the general public. . . . Rates for carrying mails on railroads should be less than those which might be fixed for commercial business." If the argument is that the mails are

a means of communication for the government and for citizens, and hence should be carried at a low rate, it is only necessary to point out that the weight of letters and government matter combined according to the report of the department for 1912 made only 17 per cent of the mail, as against 83 per cent newspapers, magazines, books and merchandise, which are essentially freight. Since that report the parcel post has been established and has swollen to a degree unknown the ratio of "freight" mail to letters and government matter. The department does not attempt to present in 1913 a corresponding analysis. If the argument is that mail-carriage develops the territory served by a road and produces remunerative tonnage, it is sufficient to reply that on that very theory passenger rates have already been depressed below the freight basis by the states and railway mail earnings are even lower than passenger. If passenger rates are to be raised, as Mr. Brandeis suggests, why reduce mail pay?

The most disinterested witness is M. O. Lorenz, associate statistician of the Interstate Commerce Commission. Dr. Lorenz attended hearings of the joint committee and participated in colloquies between representatives of the department and of the railway committee, of which the chairman is Ralph Peters, president of the Long Island Railroad. Dr. Lorenz reached his conclusions as to rates by two methods—first, cost plus taxes and interest on bonds without contribution to dividends or surplus; second, passenger train earnings minus an arbitrary 10 per cent representing those passenger train services in which mail does not participate. Dr. Lorenz says:

"On the basis of the commercial principle, the conclusion is reached that 22½ cents per 60-ft. mail car hauled one mile, with a separate payment for side and terminal services, would constitute a fair adjustment for the first year, being an increase over the present rate of pay, but still probably an underpayment." The 22½-cent rate, Dr. Lorenz states, "would be an increase of certainly more than 10 per cent."

This was on September 27, 1913. On February 12, 1914, Assistant Postmaster-General Stewart submitted his draft upon which the mail pay provisions of the Moon bill are based, and instead of 22½ cents, which Dr. Lorenz concludes would be an underpayment, recommended "not exceeding 20 cents." This aroused so much protest that the postoffice department proposed, and the House Committee on the Post Office and Post Roads adopted, an amendment making the base rate "not exceeding 21 cents," still 1½ cents below the rate on which Dr. Lorenz says mail service would make no contribution to dividends or surplus.

Proposing, in other words, a nominal rate schedule which the expert of the Interstate Commerce Commission says would perpetuate underpayment, the department would reserve to itself the power to reduce even that rate.

The Moon bill in providing that the postmaster-general, without appeal, shall by estimate in advance determine how much service shall be paid for at the rates determined by him, also without appeal, ignores another fundamental business principle.

Congress in adopting such a method would be compelling a railroad to accept a contract which no business house free to decline would accept—a contract agreeing to furnish material for a lump sum, the quantity having been estimated by the buyer and any excess over that amount to be furnished and not paid for. The present statute prescribes quadrennial weighings, about 90 per cent of the service being thus computed and the remainder by space and otherwise. The Moon bill makes weighings annual, but reduces to about 10 per cent the traffic which is to be weighed; about 90 per cent is to be computed by space, and this not space used and measured, but space estimated and authorized in advance by the department. For actual weighings it would substitute the individual personal opinion of officers of the department as to the service which will be performed. While changing the weighings from quadrennial to annual, the bill would shift measurement on the bulk of the business from actual weighings to estimates and from statutory mandate as to method to the discretion of the department, without appeal either as to method or as to the result of applying the method.

Power to determine method and frequency of measurement of mail service performed ought to be statutory, or at least subject to appeal.

The parcel post illustrates the practical importance of this principle. The growth of that service should be considered with special accuracy, because of its immense volume, because it deprives the railways of express and freight revenue, and because its development cannot be computed in advance.

In our judgment measurement should be annual or oftener and the frequency and method of ascertainment determined or umpired otherwise than by the postoffice department.

The Moon bill comes before Congress with powerful momentum. It is based upon a draft made by the second assistant postmaster-general, reported by the House Committee on the Post Office and Post Roads without minority protest, made the subject of a special rule of the House, and contains provisions which attract to its support without reference to railway pay the following:

1. Applicants for assistant postmasters in first and second class postoffices, with whom incumbents must under the bill compete in examinations. 2. First, second and third class postmasters, whose salaries are dealt with. 3. Persons performing service for contractors in carrying the mail, whose claims are made liens. 4. Federal and Confederate veterans, who are exempted from age limitation in selection of fourth class postmasters.

These extraneous provisions, whatever their merits, give an interested motive in the passage of the whole bill to large numbers of persons and tend to deprive of the consideration which it deserves the main question of fairness to railroads.

The largest advantage hoped for from increases in freight rates is the strengthening of the market for railway securities through reassurance to investors concerning the treatment which our railways may expect from the government. What will be the value of this reassurance if the government with one hand grants an advance in freight rates and with the other reduces mail pay? What confidence will investors have in the fair intent of the government if revenue for any railway service is to be determined by specifically interested persons and if provisions dealing with railway compensation are to be passed substantially as a rider upon other provisions with which they have nothing to do and for whose adoption there is great political pressure, and this at a time when an investigation covering many months by a joint committee of Congress is about to result in a report?

We believe that if Congress and the public understood the merits of this question the legislation adopted would differ fundamentally from what is proposed in the Moon bill. Congress and the country should study the question deliberately and in the light of full information.

Whatever legislation is enacted should indicate both by its terms and by the circumstances of its adoption an unmistakable purpose on the part of Congress to deal fairly and justly with the railroads.

CORPORATION EUGENICS.—The institution by the General Electric Company of a compulsory physical examination for employees seeking to return to work after illness or a period of unemployment will naturally provoke opposition on the part of the workmen affected. But the regulation should operate to improve the efficiency of the employees by serving as an inducement to them to keep in good physical condition. There is nothing the average American is so prodigal of as his health. If he knows that his job depends on his keeping fit, there will be the strongest possible incentive for him to safeguard himself against disease. The company is obviously inspired by a desire to reduce its liability under the Compensation law; but the rule may prove a benefit to the men, as have the rules against drinking, enforced by the railroads. Perhaps in the end the corporations will do more for practical eugenics than the legislatures.—*New York World.*

Maintenance of Way Section

The Use and Abuse of Cost Data

The abuse of cost data by using such information without making due allowance for local conditions has created a common prejudice against the collection and use of cost data of any kind. As outlined by Mr. Bowser in another column, there are many conditions which must be taken into consideration in making an accurate analysis of cost figures, especially if made upon such a general basis as the cost of maintenance per mile of line. However, such objections are frequently magnified. The importance of the general collection and comparison of cost data should be strongly emphasized, for they lie at the basis of all economical practices. Evident deficiencies in such data should cause more care in their collection rather than a general condemnation of this material. If used intelligently, with proper consideration of the purpose for which they are prepared, they will reveal the weak as well as the strong points in any organization or system of work. On the other hand, nothing will tend to discourage the use of cost data as quickly as unwise and unintelligent cost comparisons, as such comparisons defeat the very purpose for which cost data are collected.

Refinements in Track Maintenance

The extent to which maintenance practices are continually changing can be realized best by comparing present methods with those of a decade or two ago and by noting the numerous instances in which practices which were then considered unnecessary refinements have since been made standard. Not many years ago curves were not spiraled and little attention was given to their correct superelevation The compensation of grades for curvature is another generally accepted principle which was once considered a refinement; and only a few years ago tie plates and rail anchors were commonly considered of doubtful value. The advocates of rail canting believe that this practice should not be considered an unnecessary refinement, but that it is warranted by the increasing service required of the track. They point to its general adoption on the European roads with their permanent track construction as supporting their contention. The fact that this practice is not widely adopted in this country, as shown in another column, indicates that it is not generally approved. But it is standard on several roads and is regarded with favor on others. As with any practice not in general use, it must be used with care, for under certain conditions it can become positively injurious. In general, our tracks are suffering from too little rather than too much attention to the refinements of maintenance. Lack of attention to the accurate maintenance of gage, to line and surface, to drainage, etc., all result in increased wear and destruction of materials and in increased labor charges.

A Threatened Shortage of Creosote

One early effect on American railways of the European war will be the curtailment of the supply of creosote available for the treatment of ties, bridge material, etc. Over 39,500,000 ties were treated in 1913, approximately two-thirds of which were treated with creosote. Over 108,000,000 gal. of creosote were required in this country last year, of which 62 per cent was imported. This oil comes principally from Germany and England. While the production of American creosote is increasing, it has never exceeded 38 per cent of the requirements of this country, and even with free access to European oils there was a shortage last year which required the closing down of several plants. Since creosote is a by-product, the war will seriously interfere with its production abroad as well as its transportation to this country, and it is to be expected that the amount imported will be seriously curtailed. Many of the plants operating in this country, and especially in the southeastern states, depend almost entirely on foreign oils and carry only a limited supply. When this is exhausted there will be presented the alternative of closing down the plants or operating them with some other preservative material, such as zinc chloride or crude oil, both of which can be secured in large quantities in this country. One favorable factor in the situation is that the war began late in the season when the treatment of material required for this year's work is approaching completion. The general policy of retrenchment enforced this year also undoubtedly has reduced the demand for treated material. While many of the plants operate throughout the year, the effects of their closing down at this season will not be as serious as they would after the first of the year, when the requirements of next year will be more pressing; and conditions in Europe may be entirely changed by that time.

Awards in Material Contest

Twenty-two papers were received in the contest on "The Distribution of New Material and the Collection of Scrap." These papers were turned over to W. J. Towne, assistant general manager, Chicago & North Western; D. J. Brumley, engineer of valuation, Illinois Central, and R. D. Long, assistant general storekeeper, Chicago, Burlington & Quincy, who awarded the first prize to Ernest Cordeal, St. Louis & San Francisco, Springfield, Mo., and the second prize to E. J. McVeigh, general storekeeper, Grand Trunk, Montreal, Que. Other papers accepted for publication were contributed by J. P. Costello, roadmaster, Atchison, Topeka & Santa Fe, Pueblo, Colo.; E. B. Fithian, general roadmaster, St. Louis, Iron Mountain & Southern, Little Rock, Ark.; D. F. Stevens, Baltimore & Ohio, Baltimore, Md.; J. T. Bowser, Cincinnati, New Orleans & Texas Pacific, Danville, Ky.; S. C. Tanner, master carpenter, Baltimore & Ohio, Baltimore, Md.; J. W. Powers, New York Central & Hudson River, Oswego, N. Y.; W. O. Houston, division engineer, Michigan Central, Jackson, Mich.; E. M. Keays, material supervisor, Chicago & North Western, Evanston, Ill.; R. B. Abbott, division engineer, Philadelphia & Reading, Harrisburg, Pa.; F. L. Burrell, general foreman bridges and buildings, Chicago & North Western, Fremont, Neb.; J. J. Hess, assistant engineer maintenance of way, Great Northern, St. Paul, Minn.; R. Huber, roadmaster, Chicago, Burlington & Quincy, Brookfield, Mo.; J. W. Carey, clerk to supervisor, Pennsylvania Lines West, Bellaire, O.; A. M. Clough, supervisor, New York Central & Hudson River, Batavia, N. Y.; W. S. Taylor, superintendent of terminals, Chesapeake & Ohio, Covington, Ky.; John Carmichael, Hagerstown, Md.; E. K. Coggins, chief clerk to roadmaster, Southern Railway, Knoxville, Tenn.; P. Quinlivan, roadmaster, Delaware, Lackawanna & Western, Buffalo, N. Y.; George E. Lowe, supervisor, Delaware, Lackawanna & Western, Elmira, N. Y., and W. F. Rench, supervisor, Pennsylvania, Perryville, Md. These papers were prepared by men in all branches of maintenance of way work and cover the entire field. They discuss the problems and the common deficiencies of our present system, and should impress upon all maintenance men the importance of cooperation. The two prize winning and several other papers appear elsewhere in this issue, and others will appear in later maintenance sections.

FUNDAMENTAL PRINCIPLE UNDERLYING THE SUCCESSFUL DISTRIBUTION OF MATERIAL

THE prompt delivery of material by the store department is essential to the economical prosecution of any kind of railway work. In order that this department may be able to perform its function it is necessary that it be given a detailed and complete list of the material desired, a sufficient time in advance to enable purchases to be made and deliveries secured. In the case of any single order the problem is simple, but when orders are multiplied by the thousand the complications increase. The expenditures for maintenance of way alone of the railways of the United States amount to about $350,000,000 annually, of which approximately $150,000,000 goes for materials used by the 500,000 employees of this department. The distribution of this amount of material over 245,000 miles of line requires close co-operation between the purchasing, store and maintenance of way departments. If the men in each department would try to put themselves in the places of men in the other departments they would better realize some of the problems confronting others, and the first step towards effective co-operation would be taken.

The maintenance of way department initiates the orders for large amounts of materials, and uses them ultimately, and it is with this department that we are more directly concerned here. The first step in the ordering of material is the preparation of a definite schedule of operations for the entire season. With this in mind the dates at which various materials will be required at different points can be determined approximately. If this information is then given to the store department it in turn can plan its work to protect these different jobs. The receipt of material on the site of work either too early or too late, results in unnecessary expense and loss. While under any system which can be devised delays will occur at times, owing to errors in one or more of the three departments concerned, an occasional difficulty should not be permitted to destroy the system and break down this co-operation.

Another phase of this problem that deserves special emphasis is that of the large amount of money tied up in material held in stock. Not being confronted with the actual figures, many maintenance of way officers fail to realize the sums which are tied up continually in unnecessary stocks of new and scrap materials and that the amount of materials so held is multiplied many times over on the entire system. The attention given to this subject during the past few years is tending to better conditions along this line, but to attain the greatest success it is necessary that each officer give the effort to improve conditions his support. As long as the men in charge of work out on the line will run carloads of excess material upon a cut-off while the inspection train passes over the main line, as was done on one eastern road, little progress will be made. The details of the proper methods of handling materials are well covered in the papers received in the contest on this subject, several of which are published in this issue.

NEW BOOKS

Symmetrical Masonry Arches. By Malverd A. Howe, Professor of Civil Engineering, Rose Polytechnic Institute. Size 6 in. by 9 in., 245 pages, illustrated, bound in cloth. Published by John Wiley & Sons, Inc., New York. Price $2.50.

The second edition of Howe's "Symmetrical Masonry Arches," which has just appeared, corrects all errors that were found in the first edition, simplifies the demonstration of the formulae and contains a considerable amount of new material. The book was written to present in simple form the elastic theory of designing masonry arches. The formulae presented in the book are not intended to be rigid or exact, in view of the fact that the materials used in the construction of arches are more or less uncertain in character and it is felt that all formulae given, although somewhat approximate, are within the limit of accuracy to which such construction can be carried out. The book includes a number of examples worked out in detail to show the various processes and methods of checking. It describes a number of typical arches and includes an appendix giving general data for over 500 arch bridges.

Letters to the Editor

RELINING A CURVE WITH A STRING

PHILADELPHIA, August 7, 1914.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Referring to the article entitled "A Practical Method for the Adjustment of Curves," in the issue of May 15, describing a method for the lining of curves by means of offsets from a string 100 ft. long without the use of instruments, I have recently been given charge of a line on which I was confronted with a most interesting problem of this kind, which a corps of engineers had failed to solve satisfactorily after extensive effort. An 18 min. curve 2½ miles long had long been the cause of many complaints. In applying the method described in the article mentioned a foreman spent six hours taking the ordinates with the 100 ft. cord, the ordinates ranging from 1¾ in. down to ⅜ in. with an average of ⅞ in. The office work in computing the corrections required six hours additional, after which the lining of the track was done, the throw amounting to as much as 10 in. in some places. A further increase in the superelevation from 1 in. to 1½ in. was made, since which time all complaints have ceased. The accompanying reading, taken with a track inspection instrument before and after the curve was lined, showed the improvement made in the riding qualities as indicated by the instrument.

	Inspection, June 16, 1914		Inspection, August 4, 1914	
	South track	North track	South track	North track
Water spills	6	17	1	3
Hor. cyclometer readings	1,321	1,914	460	1,191
Vertical cyclometer readings	473	723	211	487
Pedometer readings	184	250	108	113
Time	39	40	42	43

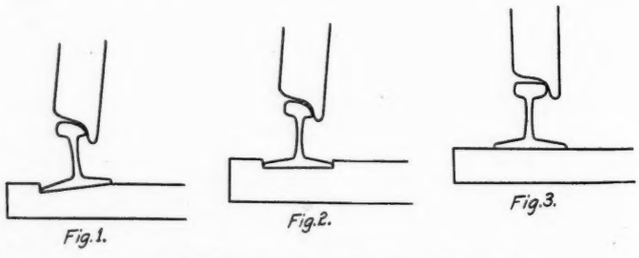
SUPERVISOR.

EFFECT OF CURVE-WORN RAILS ON DERAILMENTS

GILA BEND, Ariz., June 23, 1914.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

One of the most important items of every section foreman's duties is to keep his track in good gage. Straight track, once properly gaged and spiked, will cause little trouble, but on curves a different proposition is presented. The rails on any curve of over 5 or 6 deg., even if double-spiked, will spread from ¼ in. to 1 in. after three or four months' service.



Contact of Wheel Flanges on Curve Worn Rails

The reasons for this are obvious. When rounding a curve wheel flanges hug the gage side of the outside rail, exerting a downward and outward pressure, the outward pressure varying with the speed of the train. The wheel flange will wear the gage side of the rail to the shape of the wheel profile and at the same time the continuous outward pressure will cause the outside of the bottom flange of the rail to sink down into the ties deeper than the inside, causing the rail to "roll out," as shown in Fig. 1.

The usual remedy for this wearing and "rolling out" of

the rail is "setting up the rail." By this method the trackmen pull all the spikes, raise the rail 6 or 8 in. and square the surface of the ties with adzes or sharp mattocks, let the rail down and respike it. This corrects the gage, but the danger of derailments is increased. Before, the ball of the rail, worn to the shape of the wheel, fitted snuggly against the flange; now, having changed its position relative to the wheel, the wheel tread comes in contact with the ball of the rail on top and the flange touches it on the side, which is worn round. Owing to the fact that on a curve the wheel never runs exactly parallel, but at a slight angle with the rail, the round worn surface of the head presents an incline (Fig. 2.) in place of a perpendicular side (Fig. 3.) to the wheel flange, the slightest defects in the road bed or rolling stock are liable to cause the flange to climb the rail. For many derailments which have come under the writer's observation, the causes given were: Rough track, stiff truck bearings, uneven loads, etc. No doubt those defects contributed heavily to such derailments, but the primary and real cause was undoubtedly the changed position of the worn rail surface. Roadmasters and other maintenance of way officers should inspect carefully any curve worn rails before allowing foremen to square them up. If the rail ball is worn to the extent described, the only safe remedy is to relay that particular curve as quickly as possible.

W. E. SCHOTT,
Section Foreman, Southern Pacific.

HANDLING BRIDGE MATERIAL

SYLVANIA, Ohio, July 11, 1914.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In your issue of June 19 there is a letter from Storekeeper regarding a reduction of the stock of surplus bridge material. While the party writing this letter signs himself a storekeeper, it is quite evident that he has been something else besides a storekeeper, for he knows the requirements of a bridge and building man, as stated in the last two paragraphs of his letter, that such a man must be capable of doing almost everything as well as being a storekeeper.

The question of properly handling stock in the bridge and building department of any road of any consequence is one that probably has caused a great many gray hairs to appear on the head of more than one head of such a department. Usually a man in this department is a good builder, but a poor bookkeeper or storekeeper, unless he is properly supplied with a first class clerk. In my opinion a master carpenter on a division should be given a clerk who thoroughly understands the art of keeping stock and of keeping books so that the master carpenter need not be required to do it. His services are much more valuable along the road to see that the gangs are kept in work and are doing the work properly.

It is very true that a bridge and building man knows what work will be done each year, or at least it should be so, and in my opinion it is so on all well regulated roads of any consequence, for such roads usually prepare a program a year ahead of time. However, authority for such expenditures is seldom given before the snow has left in the spring, for the general officers will say, "There is plenty of time before you will do this work, so why order the material?" The facts in the case, however, are that such material can seldom be supplied short of 60 to 120 days. Therefore, if authority is not granted until, say, March 1 and the material does not arrive until July 1, there is not very much of the working season left, if the program is at all extensive. I very well remember one season while I was division engineer that we ordered our materials in plenty of time to have our work started nicely about July 1. The requisition, however, was not authorized by the general officers until such time as to bring the material on to the division along in November. Anyone familiar with bridge and building work knows full well that this puts an engineer up against a condition which is rather hard to combat.

However, we were fortunate in having a storekeeper at headquarters in the mechanical department who had a great deal of material on which we could draw and make the most important repairs to our bridges and buildings. The result was that we engineers were caught along in December with a great stock of bridge and building material on hand which brought upon our heads a most severe censure. This then brought about a revision by the storekeeping department as to bridge and building material. It was decided, and I think wisely, that a certain stock of material would be kept on hand by the mechanical storekeeper for the use of the maintenance department on proper shop order or requisition. This stock was determined by the division and general officers and included a certain amount of bridge material which, as I remember, was enough to build a bridge 100 ft. long, together with enough other materials to put up a small freight house. We also were permitted to carry at a few places, probably 100 miles apart, a few bridge stringers, caps and ties for use in extreme emergency. This stock, if well watched, should usually be sufficient to take care of any emergency on the division.

The next year we then started a system of ordering our materials delivered at one end of the road in carload lots, say enough to take care of one month's work in the bridge department. This was required to be delivered at a certain time. Another quantity would be delivered a month later and so on through the season. This gives the purchasing agent a chance to buy this stock at fairly good prices and at the same time not carry in the maintenance department a very large stock balance of such materials. This material was usually unloaded by local way freights on the site of the work, which of course saved work train service. Materials for repairs to the buildings were also ordered by the carload under the same system.

Co-operation between the general heads of departments and the purchasing department when requisitions are forwarded by division officers should, in my opinion, make such a system quite practical. I do not know how this system worked out, as I left shortly after it was inaugurated, but believe it to be a system which will keep down the stock balance to the lowest possible point.

A. SWARTZ.
Vice-president, Toledo & Western.

COMPARISON OF MAINTENANCE OF WAY COSTS ON A MILEAGE BASIS

BY J. T. BOWSER
Queen & Crescent Route, Danville, Ky.

The comparison of mileage costs of maintaining track and structures appears to be the general method used by railroad executives in judging the relative efficiencies of organizations or of standard practices. These comparisons are, as a rule, made between the costs of two or more divisions, or between two or more affiliated roads, and quite often between competing lines.

It is generally conceded that these comparisons can only be considered very broadly at best, on account of widely varying conditions existing on different roads. It is, however, in comparing divisions or lines operating under apparently the same conditions and through country of apparently the same general character, that such figures are often misleading. If we look beyond the general conditions in making comparisons of costs, wide discrepancies may often be reconciled.

The number and length of the grades should be considered, not the ruling grades. A grade, as a rule, means fast track, and fast track means increased maintenance costs. A difference in the maximum curvature may make quite a difference in the cost of upkeep of track, the increased wear of the rail alone being considerable. The number, length and character of the tunnels are not often considered at first glance. Tracks may traverse a district for miles where the material available for roadbed is of very poor quality, and

yet such a condition may be only local and may not affect a parallel line or a division operating through country of apparently the same general character. Also in comparisons of the cost per mile to maintain bridges, trestles, etc., the number, length and character of construction are not always given due consideration.

It is often the subject of remark, among patrons of railroads and among railroad officials as well, that the general appearance of buildings and grounds on one road is very much better than on another railroad, the railroad official probably adding, mentally, "and on less money too." In such cases, do they always consider the number and kind of buildings to be maintained? Is it kept in mind that the road which does not make such a good showing, probably has to provide and maintain cottages for its section men, operators, agents, etc., at a number of its stations? Is the character of the communities which it serves taken into consideration when judging the appearance of its station grounds? Grounds at stations where a heavy freight business is done, or where timber, ties, etc., are stored prior to shipment, cannot be kept as neatly as grounds at stations where this is not the case.

A very important item in expenses which may not always be taken into consideration in making comparisons is created by the ruling of the Interstate Commerce Commission, which provides that in all betterments which at first glance do not appear to bear any relation to maintenance costs, the cost to replace in kind the structure on which the betterment is made, must go as a charge to expenses. Thus maintenance costs on a road which is following out a policy of heavy betterment, such as replacing light bridges with heavier construction, may show greatly increased maintenance costs, which are not to be explained until the above mentioned ruling is recalled. A fair comparison is a gage of efficiency, a healthy rivalry is good for us; but do we always give each other the credit for what "we are up against"?

DISCIPLINE RECORDS IN THE MAINTENANCE OF WAY DEPARTMENT

By A. Swartz
Vice-President, Toledo & Western, Sylvania, Ohio

Discipline among maintenance of way employees sometimes is a difficult question to handle, depending somewhat upon the character of the employees. Foremen in the track department as a class are of a sensitive nature, so that whatever discipline is necessary it should usually be applied with a great deal of consideration. These men are somewhat different from men in train service, as the results of their work are so much more apparent to everyone. They usually take a great pride in their work and look for commendation, which is very natural among men with a limited education.

My personal opinion regarding the suspension of track foremen for some breach of rules is that very little result is gained by applying such a method. These men usually can be reached more quickly by giving them a good lecture and stating to them the possibility of danger which might have resulted or which did result from the breach of rules. There are no doubt some cases where track foremen positively must be taken out of service, but which all will agree has been done in the past sometimes without proper regard for the results to the road, as well as to the laborers, who are left on the section to be handled by an entirely new man.

I believe in having a man on the section as leading laborer who can at times take charge of the section as might be necessary by the sickness of the foreman or by the foreman being called away on extra gang work for a month or so. However, I never was thoroughly satisfied that when a change of foreman was needed it was best to put this leading laborer in the vacant position as foreman. I think better results are obtained by bringing a foreman from another section or a bright leading laborer and shifting the leading laborer on the section where the position is vacant over to the other section. This way of dealing will bring about better discipline among the men, will result in better work being done and less chance thereby being given for disciplining the foreman because of the fact that the men know how to do the work under the instructions of the foreman.

It has been my observation that any discipline to the foreman is usually brought about by the slackness of some of his men, which, of course, can be laid to the door of the foreman by calling it improper supervision. However, at times men do things which the foreman does not supervise at the very time it is done.

Track supervisors should always have a personal record of all foremen in their employ, together with that of the leading laborers. It possibly would be well if the supervisor kept a record of the minor happenings on a foreman's section so that when it was necessary to apply discipline he would have the past record of his man before him. There are of course some supervisors who can very readily carry a record of these men in their minds at all times because of their close dealings with them day after day. However, such a record is not in the hands of the general roadmaster or engineer in charge of the division unless a written record is kept. There are times when the engineer wishes to know these points about track foremen when filling a vacancy which would result in a promotion for a foreman.

At the same time when keeping a demerit record, as it may be called, I think that a merit record should also be kept. This has been my policy in handling men in the operating department. A record such as this shown to the men themselves in case it is necessary to apply discipline very forcibly impresses on their mind that their actions are being watched. Provided they are men at all they should have some natural pride in keeping down such records. I think it will be found that it is very seldom necessary to dismiss or suspend a foreman and for but very few reasons, excepting the use of liquor.

Perhaps one of the most serious offenses which a track foreman might commit would be to permit his hand car or motor car to be struck by a train. In such a case conditions surrounding the accident must necessarily determine the discipline to be applied. As a rule, however, such acts are very gross negligence and the foreman permitting such accidents is generally ready to be dismissed.

One of the best ways to maintain discipline among track foremen is for the roadmaster or the engineer to keep a record of the work which a foreman has been told to do, stating the time at which it should be done; then if the work is not done within the allotted time the foreman should be reminded of the fact and required to give a first class excuse. If this occurs frequently a severe reprimand with a threat of dismissal will surely bring about the required results. If such action is followed this class of men will be very careful to perform their duties according to the rules of the railroad.

It is my opinion that a foreman who has been reduced to a track laborer will very seldom make good again unless, of course, he had been made a foreman on probation, as you might say. The old track foreman, having been such for a number of years, does not take very kindly to working as a laborer, so that usually it is best to let him go entirely or ship him to the other end of the road to act as leading laborer if it is thought that another chance will wake him up.

It is my opinion that all division engineers should keep a whiphand on their roadmasters, requiring that except in extreme emergency the dismissal of a foreman must first be sanctioned by the engineer, for without a doubt some roadmasters being so closely in touch with men will at times develop personal feelings so that they sometimes dismiss men for these reasons. However, we will admit that with the class of roadmasters now being obtained this is not so customary as in years past. The same sort of discipline can readily be applied to foremen in the other sections of the maintenance work, such as bridge and building, waterworks or interlocking departments.

The Handling of New and Scrap Maintenance Materials

The Prize Winning and Other Papers Received in This Contest. Practical Discussions of the Problem

FIRST PRIZE—THE HANDLING OF MAINTENANCE OF WAY MATERIALS

By Ernest Cordeal

St. Louis & San Francisco, Springfield, Mo.

Any effective plan for the handling of maintenance of way material must be one which insures co-operation between the purchasing, stores and maintenance of way departments. Each of these departments had to do, at some time or other, with the materials which are eventually used in the maintenance of roadway and structures, and each should assume its proper share of responsibility for the insurance of the utmost economy.

Aside from emergency requirements, the maintenance of way department should be able to anticipate its needs within close limits, for a year or more in advance. The purchasing department, provided with accurate information as to requirements several months in advance, should be able to buy at such times and in such quantities as to obtain the best prices, at the same time insuring delivery in advance of the time when this material will be required for use. The stores department, standing between the purchasing and the consuming departments, is in the most favorable position to hold the balance, curbing the tendency of the maintenance of way men to accumulate and hold an over-supply in fear of unexpected shortages, and regulating the rendition of purchase orders so as to prevent either over-stocking or shortage.

The accounting for material from the time of the origin of the order for its purchase to its final disposition as useless scrap, should undoubtedly be in the hands of one and only one department, preferably the stores department. Often interruptions occur in the performance of maintenance of way work and stocks of material remain on hand for periods of months, or even years. In case such material has been turned over by the stores to the maintenance of way department, it is more than likely that its existence will be overlooked; material of the same kind and grade will be ordered unnecessarily to provide for the current needs of some other part of the system and the unused stock will deteriorate and depreciate in value, or be lost by theft or by lack of systematic care.

Foreseeing future requirements in times of fairly stable business conditions is not accompanied by any great difficulties. Records are, or should be, available on every railroad from which a very close estimate may be made as to the requirements each year to provide for the ordinary work of maintenance. It is true, that such estimates may be rendered inconsistent with demands by unforeseen depressions calling for retrenchment, by unexpected prosperity leading to increased activity, or by disasters of considerable consequence, requiring immediate and extensive replacements. Such phenomena are, however, of so infrequent occurrence as to be negligible in the consideration of the material problem.

The material which will be required during any year for the construction or renewal of tracks, bridges or buildings is accurately known months in advance. The maintenance of way department should be able to formulate a definite plan of operation, setting forth the approximate time at which each piece of work will be commenced. This will enable the store department to file its orders with the purchasing department at such time, and in such form as to permit of contracts for material being so placed as to provide for delivery at a time but little in advance of actual requirements, without interfering in any way with the exercise of economical methods of purchase.

All requisitions for material, whether for ordinary maintenance, or for construction and replacement work, should originate with the using department and should pass through the store department. The accumulation of surplus or obsolete stock is frequently the result of efforts on the part of the store department to keep up its supply of material to meet prospective needs, with insufficient knowledge as to changes in standards or variations in requirements.

Requisitions for material rendered by responsible officers of the maintenance of way department at a fixed time in advance of the date needed, would provide the store department with the necessary information to request purchases with accurate knowledge as to requirements, and would thereby prevent over-stocking, or the ordering of material which had been rendered obsolete by changes in design. In passing through the store department, requisitions for material should be carefully checked against the stock on hand, to prevent the placing of purchase orders for articles already on hand. The purchase orders passing from the stores to the purchasing department should be forwarded well in advance of the desired date of delivery, enabling the purchasing official to profit by market conditions.

In the absence of complete and reliable data as to future requirements, the purchasing department is often led by reason of temptingly low prices to stock up heavily on certain classes of material. Such a procedure may be responsible for a large ultimate loss. Interest on the capital invested, depreciation in value due to the necessity of holding the stock for a long period, or total loss of value through a revision of standards may more than offset the initial advantage gained in unit price.

The suggested plan of ordering wherein the maintenance of way and stores departments co-operate in furnishing reliable forecasts as to requirements, if competently and consistently followed, will materially assist in maintaining at a minimum the amount of capital investment in materials.

The material once delivered to the railroad by the producer or manufacturer should be entrusted to the store department, and should remain in its possession until the time of its actual use in repairs or construction. The evils resulting from the practice of turning material over to the maintenance department, to be distributed or stored and accounted for, are manifold. Each division superintendent, roadmaster, section foreman or bridge and building foreman, in a more or less mistaken endeavor to protect himself and his division, increases his orders above his actual needs and accumulates a surplus stock of materials, which are often held pending use for long periods, are frequently lost or destroyed, and represent at all times an unnecessary investment of capital. Large quantities of material scattered over a wide territory are very difficult to keep in strict account, even when their care is in the hands of a department thoroughly conversant with material accounting, and when such a task is required of men burdened with the numerous other duties in connection with maintenance of way, the bookkeeping feature is almost sure to be neglected.

The handling of materials in stock between the time of purchase and use is strictly a store department problem. The ideal condition from the storekeeping standpoint alone would be that in which it were possible to make delivery of all material on cars loaded at the point of purchase, directly to the point of use at the time required. A considerable part of the maintenance of way material may, in fact, be handled in this way, particularly if due consideration is given to placing loading orders, so as to make possible distribution without preliminary sorting or handling.

A great amount of material cannot, of course, be handled in this manner, but must be unloaded and stored, reloaded in such quantities and at such times as required and delivered to the point of use. The handling of such material is the principal function of the store department, and is the item wherein is

found the greatest opportunity for effecting economy by the introduction of adequate methods of storing, and of keeping an accurate check of stock.

Centralization of stores at one or more principal points, from which points issues are made at frequent and regular intervals to smaller points, or direct to the work, simplifies the handling of the material at the same time that it permits protecting all requirements with a minimum stock of each class of material. The central store, located preferably at a point nearest to the base of supplies to minimize useless back-haul, should receive, store and carry in account all material, and should by means of regular and comprehensive reports maintain records of the stock carried by each of the sub-stores.

The systematic arrangement of store shelving and bins, as well as of the platform and yard, to provide for the segregation of the various classes of material to simplify the filling of requisitions, to enable inventories to be taken with great accuracy and little difficulty, and to render the detection of shortage or overage of stock a matter of certainty, should be given special attention. Bin sizes, shelf and platform space and dimensions of skidways should be carefully planned, so as to accommodate the maximum stock required at any time. Minimum limits may also be set to indicate the point to which the stock may be allowed to decrease before orders are placed for its replenishment.

The handling of second-hand and scrap material in such a manner as to secure therefrom the maximum value in reclaimed parts, and the highest market price for that portion which cannot be put to further use by the railroad, is an important factor in reducing the net cost of operation. For all the material used in repairs and replacements, an approximately equivalent weight of scrap is released. Nearly all of this old material possesses a certain value if presented at the proper market. Aside from this value as scrap, it has been demonstrated by a number of railroads, which have gone into the matter of reclamation, that about 20 per cent of the material which is ordinarily sold as scrap may be worked over at small expense and returned to stock to be used in place of new material.

The mere sorting of scrap by competent material men will net large returns on the labor expended. Not only is it possible to secure higher prices for scrap material carefully sorted into the different grades, but during the process a large amount of usable material will be found, which without repairs of any kind can be returned to the store department.

The reclamation of large quantities of material may be effected without any great capital expenditure for the erection of an extensive plant, or for the installation of expensive machinery. A few inexpensive machines, such as pneumatic hammers for straightening bolts and rods, bolt cutters, forges and shears, may be used to great advantage.

Undoubtedly the greatest agent of reclamation is the recently invented process of oxy-acetylene welding and cutting. With a small oxy-acetylene installation at command, a reclamation plant will be able to repair great numbers of castings and forgings, which must otherwise be sold as scrap. The cutting burners are most effectually used in reducing large scrap units, practically worthless in their entirety, but increased to a substantial value when cut into sizes convenient for handling. The cutting may be done very rapidly, and at an insignificant cost by use of the oxy-acetylene burner.

SECOND PRIZE—THE PROPER DISTRIBUTION OF NEW AND THE COLLECTION OF SCRAP MATERIAL

By E. J. McVeigh

General Storekeeper, Grand Trunk, Montreal, Que.

Since the railways were first divided into departments, one of the evils they have suffered from has been the lack of co-operation in the handling of supplies. It was discovered that the best possible excuse for work not done, or delayed, was "waiting on the stores for material." So there has been a lack of co-operation, and the supply department has been made the scapegoat. This has reference to the securing of material as required, and not to surplus material and inflated stocks.

In considering how material should be handled through the stores department, co-operation must be our cornerstone, We will assume that we are dealing with the ordinary railway with its full complement of departments, including that of the stores. Each department should make an effort to anticipate its wants in general maintenance material for 60 days in advance, and send to the storekeeper a requisition properly signed on a specified day in each month, for this material. In making this up the quantity used in the past should be considered, and extra work to be undertaken, taken into account. A full and careful description of the article wanted should be given when it is a thing not in common use, and it should be clearly stated how, where, and why wanted.

In compiling a purchase requisition from department requisitions the storekeeper should give all information possible, adding to that furnished by departments when necessary. He should place all regular maintenance supplies and material on one requisition, and material for betterments or unusual supplies on another, designating these as "A" and "B," or other distinguishing marks, and using different colored paper to further distinguish them, the idea being that the executive officer may tell at a glance what requisitions he should consider carefully, and may safely hold up for consideration, without causing delay and confusion, by holding lists containing material and supplies actually required for the economical operation of the road. The requisition covering the regular stock supplies should be passed on to the purchasing agent at once, and the supplies ordered for prompt delivery. The executive should hold the storekeeper strictly to account for these supplies, the criterion to be the monthly balance figures and the periodical stocktaking. If these requisitions are not carefully made up, and more material is asked for than is actually required for use in the period, the result will show up at once in increased stock on hand. The inventory must be taken by someone other than the storekeeper, and preferably by the auditor of disbursements.

It should be understood that the storekeeper has the right to question any items on department requisitions in his territory, and advise against the purchase of such items as he may consider unnecessary. No item of material on any requisition should be canceled, or reduced in quantity, without the maker of the requisition being advised. No one questions the right of the executive officer to cut off items, or reduce quantities, but it is poor business to leave men in the dark as to what they may expect. The treasury of their company suffers by uncertainty. The stores people should be promptly advised of all contemplated changes in standards, so that, as far as possible, they may avoid being caught with a heavy stock of discarded material on hand.

Finally, the three important factors in maintaining low stocks are, co-operation between the departments and the storekeeper in all things pertaining to material and supplies; careful supervision of requisitions by storekeepers, and prompt purchase and delivery. I have put this last, but it is possibly the most important of all, because prompt purchase and delivery is one end of co-operation, and a very important end. Failure at this end leads to nearly all the evils we suffer from in the handling of supplies. It destroys the other fellow's co-operation. We impress on the storekeeper, the locomotive man, the car man, and all the others, that they *must* ask for a 30 days' supply only, and they *must* make an honest effort to play the game. They get a 60 to 150-day delivery, or worse, and they get into trouble. By the time they get out of it, they make a vow that never again will they be caught in that way—in the future they will look after themselves. One-ended co-operation is no good.

This really throws each man back on his own resources, he proceeds to lay up supplies to protect himself, and stock figures go up in leaps and bounds. In cases where men holding the material make their own inventory, it is frequently the practice to "cook" the figures.

The last condition is worse than the first. The money has been paid out, and the material is in stock, but no one knows it. With material on hand for which no account must be made, carelessness in handling it results. Co-operation is the only remedy, and it can be secured by education, and a restoring of confidence. Men order material lightly because they may get it, and they may not. If they are taught that they will get what they ask for, but *will be held strictly to account for it,* not only on paper, but in fact, *and they are so held,* matters will be greatly improved. It has become a habit on many roads for the departments to resent the storekeeper's supervision of requisitions, but if any intelligent man will carefully inspect the requisitions that come to the storekeeper during six months, he will understand why such supervision is necessary and important. The thing that will appeal to him strongest is how supposedly practical men can make such ridiculous mistakes in ordering the material they use in their business. It is not that the storekeeper knows more about each man's business than the man himself does, but he is a check, and who of us would want his important work to go out without being checked? The man ordering lumber is thinking of his building, not how the lumber can be got to best advantage.

After the securing of the material comes the distributing of it, a matter of even greater importance, and one that means much more labor and expense. The fundamental principle here is that all material and supplies shall remain the property of the supply department until actually used. On large railway systems it is neither profitable nor advisable that there be a sufficient number of storekeepers employed to deliver all the material in detail to men who will actually use it. But the supplies in the hands of the departments must not be considered as removed from the jurisdiction of the storekeeper of the division, and whether the parties making the final distribution report it to the storekeeper or auditor, the material should be under the general supervision of the storekeeper of the division, as representing the supply department.

On each division the departments should put in requisitions once each month, these to be an estimate of their requirements and to be approved by the general heads of departments. The material may be issued in detail on requisitions signed by the head of the department on the division, always with the understanding that the division storekeeper shall check them closely, and refer back, or reduce quantities that he finds excessive. Having records of quantities supplied, he can do this as no one else can.

In the handling of scrap, and reclaiming usable material, the first principle to be laid down is, that the department making the scrap must not be allowed to make the final sorting, and reclaiming before it is sold. This may sound somewhat radical, but I make the statement advisedly, knowing whereof I speak. The working departments are just as incapable of handling their scrap properly as they are of handling their new material to good advantage. The scrap pile is the grave for too many mistakes, of both sins of omission and commission.

Man is an animal that does one thing at a time, if he is to do anything well. While he is maintaining track he cannot handle scrap to advantage. While building or repairing locomotives his heart is in his shop, not in the scrap yard, and it is right that it should be so. This is the age of the specialist. Many men have specialized in scrap, and made fortunes thereby. The railroads are the greatest scrap makers in the world. In some years they make $200 worth per mile of road operated. In other words, it is one of the biggest things in the railway world. Why should not they have a specialist to handle it, especially in view of the fact that in nearly every carload of railway scrap sold, there is enough good usable material to pay for the handling of the load, leaving the amount realized from sale a net profit?

Beyond all question, scrap should be sent to central scrap yards and sorted under the supervision of a man who makes a specialty of that work. This man is not made in a day, or a year, nor in five years. He must be familiar with all railway material, and its value. He must know the material so that he may rescue anything that can be used again. He must know the value so that he will not spend more to reclaim an article than the article is worth new. And he also must work in close co-operation with all departments, so that he will not spend money to rescue material that, while fit for use, is nevertheless scrap, on account of changes in design that have made it obsolete.

Most of the railways have a number of flat cars that are out of commission as traffic handlers. These cars should be used in the scrap business. At each shop, money is being spent in an attempt to sort scrap. Stop this, and load the material direct from the shop on to these cars, a number of which may be assigned to each shop. When the car is loaded, bill to a central scrap yard, where it will be promptly unloaded, and returned with a load, or part load, of reclaimed material.

The scrap yard should be laid out on a liberal plan, and should include space for rails of all kinds, frogs, boilers, bridges, and steel cars. The miscellaneous scrap should be unloaded in one pile and sorted from there into separate piles, according to classification. A locomotive crane with a magnet should be used both to shunt cars and to handle the material. Reclaimed material should be piled close to a track for reloading on cars.

Material to be worked over may be returned to the shops, and the work done there, or the necessary machinery may be installed at the scrap yard. Personally, I am of the opinion that work should be done at the scrap yard. The shops want their material ready for use, they will not do reclaiming work willingly, and what we do against our will, we do not do well, or cheaply.

Much time is wasted on many of our railways by the office staff in looking after credits for salvage. There may be something in this for the department, but there is nothing in it for the company. Receipts from scrap yard can go in as extra revenue, and be credited to departments on percentage basis. Good material may be charged back at the price of new when ready for use, or if it is worked over, at a price agreed upon.

APPLYING "SAFETY FIRST" METHODS TO MATERIAL HANDLING

BY E. M. KEAYS

Material Supervisor, Chicago & North Western, Evanston, Ill.

The long and heavy trains of scrap that used to be cleaned up from certain divisions on this road were the subject of many a tale years ago. This is not true at present. Last fall such a train was planned by the operating department on one of the heaviest divisions. The road scrap picked up didn't justify the wages of the train crew. Many of the section foremen said at the time, "If you clean out our scrap bin now, we won't have anything for the regular scrap car next week," or, "If you take away our scrap tools now, we won't have any to exchange with the supply car next trip, and what we can't exchange will be cut off." Nothing could better illustrate the attitude that scrap education has at last produced.

One day last summer, after going over several very clean sections carefully, I came to the end of my work at the last section tool house, just at 6 o'clock, and waited for the section gang to come in on their car. The inside of the section house was another mark of the foreman's workmanship—no "junk" in corners or under the bench, and everything in its place. Before the car was run in for the night, the day's accumulation of small scrap, together with several pieces of car scrap which had been picked up, was unloaded into the scrap bin, and the tools on the car were placed in their racks—everything made shipshape for the next day's work. That's the condition that ought to exist all the time on all sections.

There are, of course, foremen whose very mode of life can be told from their tool houses. There are foremen who "haven't got the time to be bothered with a few old bolts and stuff"—"give me another man and I can do all the fancy work you

want." The scrap propaganda has been one of education for years. Most of the foremen have now been brought up to see that it's easier to bring in the daily scrap than to take the best part of a day cleaning up just before the scrap car is due. A clean tool house, with well-maintained tools, and an ample scrap bin, mean so much towards the efficiency of the section gang that we can't stop to argue about it nowadays. The class of laborers that are employed now only learn by example, and the tool house is both the beginning and the end of every day's work.

Well-maintained tools need not be expensive tools. Storehouses catch a lot of criticism about furnishing the cheapest thing on earth. In three cases out of four it will be found that the loudest denunciation of this kind comes from the foreman who has half the tools on the section in a perpetual state of disrepair. There is a class of foreman who will let his men go thumping over a section week after week on a handcar with loose gears and bearings till the poor old car falls to pieces before he will do ten minutes' work on it. It is his class that keeps better tools off the road.

Some foremen who have learned to be excellent workmen are tough customers when it comes to their "treasures." One foreman had five red lantern globes in his house. Nobody knows how long he had been waiting and carefully ordering these at times when he thought they would slip by to him on requisitions. His excuse was that three years ago the neighboring foreman had borrowed one—"you can't tell when we might need all of these—the station agent might want one, too, some day." But globes cost 50 cents each. Engine tools that are gathered from the right of way are often carefully accumulated and hidden. The problem is to get them turned over to the supply car monthly. If you can't get the foreman to do this voluntarily, you might as well make up your mind to spend the time to make a thorough check of tool houses several times a year.

One foreman had the usual supply of stock rails at his tool house, but also had a multitude of short pieces of all lengths. These pieces were neatly assembled behind the tool house on some old ties, all in the neatest order. Asked about these, he began to be a bit touchy that he was being found fault with, until it was shown to him that in the usual course of events it would be 19 years before his supply of pieces would be used up, and that long before that time he would be on the pension roll, and his side tracks would all be laid with 90-lb. instead of 72-lb. rail. When the money value of those pieces was figured up, and he came to realize that the only dividend being earned was rust, his spirits revived, even when he was told to load up more than three-quarters of it. Tons and tons of steel may sometimes be brought in off the road in this way. Even though a new rail has to be cut occasionally here and there, this will be the cheaper method.

One foreman was very proud of the switch lamps in his yard. He had 31 main line lamps on side tracks in his yard, and one had to admit that they were maintained in a condition to be proud of. He spent so much time on those lamps that this in itself would have been a reason for taking them away. Every engineer coming over those Nebraska plains at night must have been able to see that galaxy of red and green lights for miles. How anybody could figure out which was the main line at night till he got right on top of the switches was a puzzle. Even when presented with this view of the matter the foreman resented being put off with something cheaper—a common side track lamp. When the yard was built a few years before, the construction forces had left these main line lamps, and they were an heirloom. His contention, as far as safety was concerned, was that main line switches were always locked. We showed him one that wasn't. After that those lamps came in very peaceably.

It is easy enough to storm at a foreman, but that method never made good workmen, and they are quite as willing to be good workmen as any other class of men. It is one thing to antagonize men, and to get things done because they know they have to do it; it's another thing to show them that a little daily care towards keeping things in order makes the work easier all around, and is the "right" way to have it done. To do this, not only must one have the co-operation of the roadmaster, but he must make him a thorough convert to the business side of the matter, so that his attitude while among the men is infectious. Some of the best results have been obtained after a quiet walk up the track with a roadmaster and foreman, pointing out each bit of scrap, even as small as a nut or washer, and calling off money values of each as it is passed—"That rod over in the ditch will be worth 90 cents as soon as you send it in to be straightened; that bolt is worth 3 cents now before the thread gets all rusted up," and so on.

Many foremen who do not readily respond to the teaching that scrap is valuable, and for this reason must be cared for, will soon see the point if they are called to account for it as a disfigurement to the section. The men who will leave a drawbar lying out in the ditch day after day are becoming fewer and fewer the more they know that they are certain to be criticized for "that litter out there." Many a man has come away with a different idea of material after he has seen the piles of scrap fed through the reclaiming plant and come through on the other side all sorted and ready for its many uses again.

Because car material coming in off the road is such a large part of all scrap, the car foremen are encouraged to watch for all scrap cars going through to the shops, and to take such material as can be used, or can be repaired locally. All foremen make reports as to what is thus put in service again. This saves much work in the main reclaiming yard, with its attendant congestion of cars there at times, and the double haul on the material. Certain material always finds its way to Chicago as the better facilities at the larger point enable cheaper work. The figures on the outside reclaim work are published monthly, and are instructive, both to the department officers and to the men who have been doing the work at the different points.

It has always been our policy to welcome suggestions and criticism of material and supplies. This is not meant to be an encouragement to the great army of kickers, but if a man has anything worth saying we want to hear it as soon as we can. The safety first idea again emphasizes the wisdom of an open policy of this kind. Nine reports about defective or unsatisfactory material may not amount to much, but the tenth may be valuable, and very often the situation can be remedied without expense—very often with a distinct saving.

Repeated instances like this ought to show that the only way that permanent results can be secured, and the only way that a system can be started that will become self-running, is by keeping at it. At times the men on the road are inclined to laugh at what they call the Chicago idea of co-operation: the best way to get a job done is to get the other fellow hypnotized into doing all the work while you do the bossing—victory for co-operation. There was a division storekeeper who was reproved for the untidy state of his territory. His reply was: "Oh, well, you simply can't do anything with these fellows. They don't know what you want, and they wouldn't do it if they did." Evidently this man had failed to hypnotize. Most of the sections on the division were worked by laborers who seem to understand 25 words of English, and who never get beyond. Had the same method been applied to him in his early days as he applied, he would never have graduated out of first grade in school. As a matter of fact, he had been carefully nurtured through 13 years of school, and had then been on the railway for 14 years. Then "it's no use" if some Italians can't pick up a new method in 15 minutes. This doesn't mean that he is to treat men to a pink tea before starting work with them, either.

Getting material on the ground is simple beside the problem of watching its use. The foremen keep their own material books and forward them monthly, with their coming month's orders, to the roadmaster. These books are checked; if they are not, material will disappear without a proper accounting, and from these books the division accountant makes up his material accounts, rail and tie statements, etc. The supply car takes care of standard material after requisitions have made the due rounds for approval. Rail and large orders for fastenings are ordered

through the assistant general manager. The supply cars, each of which can cover three divisions a month, are handled on the way freights according to regular schedule, and the rule of exchange of tools and other material is insisted upon. Where way freight work is heavy, the scrap cars can be handled as trailers to the supply car. If on a light division such work will delay the train, a separate scrap car is started out of designated points on a merchandise schedule. The division storekeepers reclaim what they can from these cars; the rest is sent to the general scrap yard. A distinct saving can be made in careful loading of scrap. Not only is a carelessly loaded car an annoyance which takes twice as long to unload as it should, but at times of unavoidable congestion in the scrap yard, or at times when there is a car shortage, a purely avoidable loss will accrue. This may not be appreciated by smaller points that handle a few cars of scrap a week, but at a large point as much as 50 per cent greater speed can be made in releasing equipment.

Obsolete material on the road is not as pressing a matter as in the locomotive and car departments, where a type may vanish in a few years. As the lighter rail gradually sifts down to the country divisions, where it still has a long life ahead of it, other material can follow. But don't be so thrifty that everything has to be used up. It's cheaper to buy new angle bars, even for second-hand rail, than it is to have several miles of battered joints. Get all your signal department material under a storekeeper and save money.

The safety first movement wasn't built up in a day. That idea is being emphasized all the time—when it ceases to be, results will stop. Take care of the small accidents and get the habit, and then the large ones won't happen. How many of the men who formerly were too busy to be bothered with the preventing of small accidents are yet too busy to be bothered with saving pennies so that the dollars will take care of themselves? How many of these men are still in the class that will innately fight the very idea expressed by the words material economy?

HANDLING BRIDGE DEPARTMENT MATERIAL

By S. C. Tanner

Master Carpenter, Baltimore & Ohio, Baltimore, Md.

While in general, the policy of keeping stock material at one place for distribution is a good one and prevents a lot of surplus and obsolete material accumulating along the line, I find that much economy can be gained in the bridge and building department by giving the foremen on outlying districts a lumber or material car with their camp equipment. This should be a box car of the non-revenue type, but suitable to keep the stock dry and in good condition and capable of being moved over the road in a train. The foreman should see that this car is well stocked at all times with material of various kinds suitable for taking care of emergency repairs to platforms, walks, floors in buildings and on public road crossings and bridges, so that he can make repairs on short notice without waiting to order materials from the storekeeper or from division headquarters.

Such a car is also valuable in storing the surplus material which usually accumulates when finishing a job and oftentimes is a source of supply to finish a job when the original bill runs short, thus preventing the making of a special shipment of a small amount from the storekeeper with the necessary delay. It can also be used to good advantage in taking care of perishable material, while on small jobs, such as cement, lime, paint and glass. The material supply train which passes over each division each month restocks these cars and takes back into the storekeeper's stock any surplus material accumulated, thus avoiding overstocking the cars on the road.

The material supply train is in charge of a representative from the stores department. All material to fill orders accumulating during the month which have been officially approved, is delivered at the place where it is to be used, and at the same time all the scrap along the line is gathered up and taken to division headquarters. Here it is carefully sorted. That which is suitable for future use is placed in stock; that which can be reclaimed by repairing is sent to the shops and repaired and then placed in stock for future distribution; and the real scrap which is not fit for future use is classified for sale.

When any large quantities of material or any special materials are needed, a requisition is made, and when approved, the order is placed with the purchasing agent, who makes the purchase and the material is delivered where it is to be used, thus saving extra handling and delay. All returnable worn-out material or supplies, tools and agents' supplies must be returned to the supply train before new supplies are issued. Old and second-hand bridge material is carefully guarded by the master carpenter and returned to his headquarters where it is stored for future use in building bulkheads, for blocking or temporary use as it is needed, thus saving the new material and getting full value for the old.

Much economy is derived by the proper ordering of material, and especially in the bridge and building departments. I find that it is a very common practice with foremen to order lumber in even lengths, and usually 14 ft. or 16 ft. long. This method of ordering is expensive and many times is the cause of much delay in furnishing the material. Every order should specify the exact size of lumber required, giving the length, width and thickness, so that the storekeeper can substitute other sizes which will cut to advantage. As an example, many times a lot of lumber is needed for repairs to a platform 5 ft. wide, but the foreman orders 2 in. x 12 in. plank 16 ft. long, figuring on cutting it in three pieces. This would leave 2 ft. B. M. waste, but if ordered in exact sizes, the storekeeper could furnish it in 5 ft., 10 ft., or 20 ft. lengths and would not have any waste. He could also furnish it in any width to suit the needs. It is best to let the storekeeper stand the waste.

In maintenance of way, we find as much if not more true economy in the conservative use of material as in its distribution. The right kind of material should always be used in the right place, as high-priced material is often used, when a cheaper grade would suit the purpose just as well. For example, cheap material should be used in false work or work of a temporary nature, or in permanent work that is submerged in water where it is not subject to depreciation other than decay, while, on the other hand, in permanent work where timber or other material is exposed to the weather, or other destructive elements, the very best should be used.

In wooden water tank construction, the hoops are the vital part, and all depends on them for safe maintenance. Steel hoops are much used in late years, but we find that they are far from being reliable, as their life is usually from four to eight years, and in some localities where there is salt air, their life is very short. They are used as a rule on account of their cheapness, but it is false economy to use them at any price. The very best wrought-iron hoops should be used on all water tanks, as from our experience a service of over 20 years leaves the wrought hoops in good enough condition to place on a new tank.

The best paint should be used on permanent work, but there are many times that a cheap paint would last as long as needed and reduce the cost. When asked to furnish paint for tie spotting last spring, I requested permission to prepare a cheap paint for this temporary work, which request was quickly granted. I then had the paint prepared by the following formula: Mix thoroughly together 30 lb. of white lead, 3 gal. of raw oil, and 1 qt. of dryer, then stir in 120 lb. of silica and ½ gal. of benzine. This will make 10 gal. of thick white paint, semi-paste, which will take up in use 6 gal. of benzine or any light evaporating oil; this paint will weigh about 17 lb. to the gal. We use the benzine or gasolene to make the paint short and sticky. When prepared in this way it will cost about 30 ct. per gal, compared with white lead and oil at a cost of $1.25 per gal. It will last one year in good condition, and as six months is all that is usually required, the saving on a large railway system is important. The tie spotter should be instructed to keep this kind of paint in the paste form, and when using it, should keep with him a small bottle of benzine or gasolene to thin it as needed, thus saving loss by evaporation.

In the framing of all timber, care should be taken to construct the joints so that they will drain themselves and dry out. To

paint the joints of new timber which contains sap, is poor economy, as it will not dry out and soon produces decay. All timber should be provided with a free circulation of air. In a six-year test, we find that crude oil mixed with a little lamp black to make it a thin paint, applied once a year, has proved the best resistant to rust of steel where exposed to salt air and coal and coke. It is cheap and quickly applied, and while these beams six years ago were a solid mass of scale, they are now entirely free from scale. Paint would not stick to these beams, due to the friction of the coal and coke, but the crude oil will not rub off and it therefore preserves the steel.

EDUCATING FOREMEN TO THE VALUE OF MATERIAL

By E. B. Fithian

General Roadmaster, St. Louis, Iron Mountain & Southern, Little Rock, Ark.

For the past several years the tendency has been to concentrate maintenance of way material at some central point convenient for handling and forwarding to location where needed, within the field of operation. These concentrating points are naturally under the supervision of the supply or stores department, which handles not only the requirements of the maintenance of way department, but of the other departments as well. The plan does away with the necessity of carrying material in stock on the line for new work and ordinary repairs, excepting at important junction points and in heavy terminals, where considerable inconvenience in operation might be experienced if prompt repairs are not made.

The success of this plan depends on the following eight fundamental principles: First, close watching and keeping up stock requirements of standard material. The supply department should encourage frequent conference and inspection of stock by division officials to assist in keeping in touch with division requirements. Second, furnishing correct detailed information by division officers in ordering material. Third, furnishing promptly proper material when ordered. Fourth, proper facilities for storage and prompt handling of material. Fifth, co-operation of the operating department in furnishing equipment for loading material, and moving it after loading. Sixth, education of foremen and district officers to foresee their needs, and order material sufficiently in advance of requirements, thus permitting the supply department to handle economically in connection with other work. Seventh, never order material by wire, except where prompt movement is required, and such orders should always be given preference. Confirm all such orders by regular requisitions. Eighth, never make more than one requisition for the material required for each piece of work; and, if necessary to hurry, trace same by referring to previous requisition.

The principal duty of a division maintenance of way officer is the distribution of forces and the provision of proper material for carrying out work. Requisitions for material should receive his close scrutiny for checking and following up to destination. A big mistake often made is the leaving of such work to subordinate officers or clerks, which results in improper information being furnished on requisitions, and the shipment of wrong material. This of course means delay to the work, extra cost, and often in foremen improperly carrying out the work, by taking for granted that material furnished is the material he is expected to use and making the best of it.

Over-stocking in material often occurs when information is demanded of division and other officers before they are in a position to furnish such information intelligently; for instance, requirements for bridge material, prior to inspection and approval of program. In other cases it is due to the lack of careful study and thought of conditions and requirements. Again, information is too often obtained from parties not in a position to supply such information correctly.

The caring for and collecting of maintenance of way scrap has been principally a question of education, on the road with which the writer has been connected for the past six years. Both colored and white foremen did not seem to realize that the railroad was interested in the saving and collection of all material that had a value as scrap, if not again usable. The men, of course, were less interested in this matter than the foremen, and it took time to instill in their minds that the proper place for non-usable material was in the scrap pile, at the tool house, and not over the banks, or in the nearest stream.

The running of scrap cars over the entire division each month, collecting the scrap at tool houses, has its effect in keeping before all foremen and men that the collection of scrap is a matter of interest to the entire division. We also find it necessary to point out scrap where noted and insist on its being kept cleaned.

All scrap material collected on this road is turned into the supply department, which, in turn, sorts and classifies it, saving for further use material that can be used again. Proper credit is allowed the division from which the material is received.

The finding and reclaiming of usable material, shipped with the scrap, requires an experienced and competent man. He should be conversant with all classes of material and tools, and know what is obsolete.

I find it a good practice never to permit a supervisor, roadmaster or foreman to consider a piece of work complete until all material left over in doing that piece of work is picked up and cared for, whether it is new or regular maintenance work.

TRUE ECONOMY IN HANDLING MAINTENANCE MATERIAL

By J. J Hess

Assistant Engineer Maintenance of Way, Great Northern, St. Paul, Minn.

A very great saving can be accomplished by proper distribution of materials, saving expense of rehandling and delays which occur thereby. It has been found good practice when relaying rail to have the old rail marked in accordance with classifications so that the various kinds required on other portions of the line can be loaded at the points released, thus saving rehandling. All rail fastenings and fixtures recovered are sorted, that being fit for further use separated and shipped to stores as second-hand material, and remainder as scrap, receiving proper credit from the stores department in return.

No material is kept on hand other than what is considered absolutely necessary for emergency purposes at division headquarters or some central point, and this is in charge of the stores department. Supply cars are run over the line once a month for the purpose of delivering material on requisitions which are always closely scrutinized to prevent any unnecessary accumulation. It is the duty of the roadway department to keep close check of what is on hand, in addition to showing this information in the requisition book. All surplus and worn-out materials are also loaded and taken to the storehouse at this time, so that there is never any opportunity to make a special cleanup.

The proper distance between post rails would seem to be governed by the density of traffic and the condition of the rail. Two miles would be a long ways to go for a rail in winter time during such storms as are experienced in the northwest. It is conceded to be false economy not to have good and sufficient tools and supplies, and where a surplus is found to exist it would seem chargeable to lack of proper supervision.

There is a danger of going to extremes in economizing on material. The progress of work is likely to be hindered if materials and supplies are not furnished when requested. It is quite often the case that a lack of a switch point necessitates the removal of stock rails. Frogs, crossings, etc., when permitted to remain in use after becoming too much worn are apt to cause derailments and sometimes cause flanges of wheels to break due to contact with fillers, castings, etc.

By permitting a rail to remain in track when battered at the end, the adjoining rail naturally becomes battered. If only three bolts are used where four are required, the extra strain is apt to cause breakage. The same thing applies to ties, piles and, in fact, almost everything used in roadway.

Making a Double Track Fill Nearly 185 Ft. High

The Bessemer & Lake Erie Is Using Large Quantities of Steel Mill Refuse in a 1 1-2-Mile Improvement

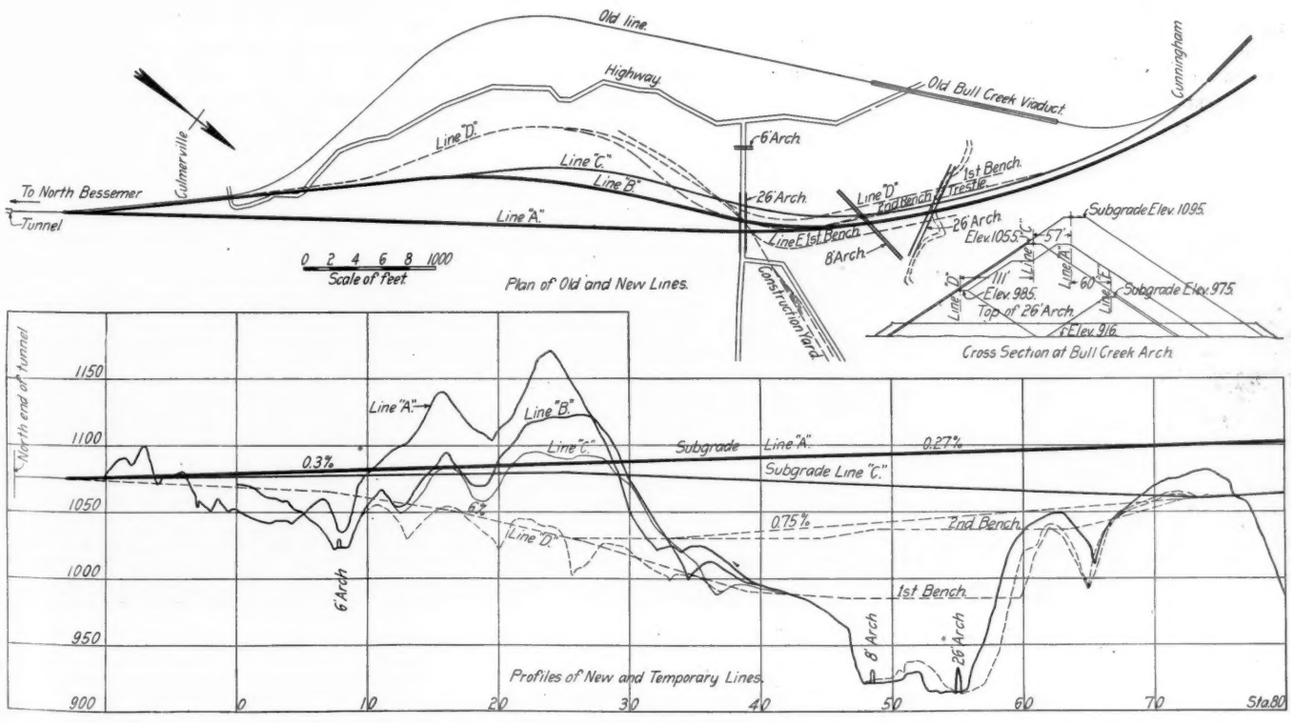
The double-track improvement which the Bessemer & Lake Erie is carrying on between Culmerville, Pa., and Cunningham, a distance of 1½ miles, includes a fill across the valley of Bull Creek having an ultimate maximum height of nearly 185 ft., which is thought to exceed that of any railway em-

Filling the Trestle on the Second Bench

bankment previously constructed in this country. This improvement, as it is being carried out at present, provides a new direct double-track line replacing one of the two remaining single track sections on the company's main line between North Bessemer and Conneaut Harbor; it is designed to form a part of a future reduction in northbound grade which will effect important economies in operation, and it serves as a means for the disposal of a large amount of steel mill refuse.

The disposing of some 100 to 150 carloads of slag and other refuse material daily from the steel mills in the Pittsburgh district which are served by this road must be considered as one of the economical reasons for building the Culmerville fill. As the road is thus enabled to obtain the material already loaded on cars by the steel works with a road haul of about 15 miles, and as substantially all this material has been through the furnace and makes an embankment more solid than could be obtained with excavated material, although the fill is somewhat longer on this line than on a line with the cuts and fills balanced, the results are in favor of this line. The first trestle was 65 ft. high. This was filled and then the track was raised about 10 ft. when another trestle 45 ft. high was driven on top of this new fill. The upper trestle did not go out of line or surface while being filled. Fills 80 to 100 ft. high made from excavated material in this vicinity have all given trouble for some years, either on account of sliding or the upper part of the fill settling down into the bottom part. This waste material has no tendency to slide, however great the weight put upon it, which is a great advantage when the fill is to be about 180 ft. high.

In common with other ore-handling roads in this territory, the Bessemer is continually seeking places along its line where this material can be used economically without wasting and with resulting advantage to the road. The refuse must be removed from the mills daily to prevent serious interference with their operation, and, as it is handled in the same cars that bring in ore, it is essential that it be unloaded promptly in order to release the cars. For this reason several available places are usually kept ready at all times so that when one filling place is completed or cannot be used without wasting the material, as, for instance, when additional trestles are needed or a change in construction



General Details of the Improvement on the Bessemer & Lake Erie Between Culmerville, Pa., and Cunningham

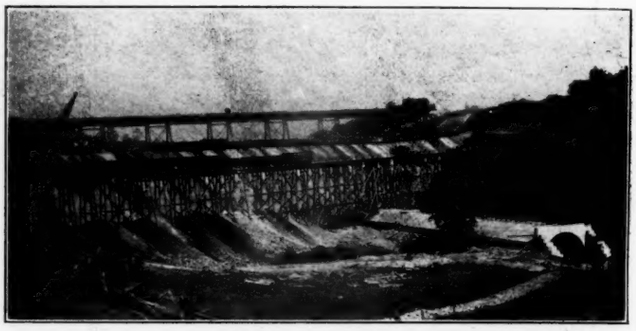
track layout must be made, the force can be moved quickly to another point and the disposal continued without interruption.

In considering plans for double-tracking the section between Culmerville and Cunningham a new alinement was sought, first, because the curvature and grade on the old line are not up to the standard which is desirable for the company's new work, and, second, because the 135 ft. steel trestle which spans the Bull Creek valley has its footings on clay, making it practically impossible to fill the structure without rendering it unstable during the operation. A number of new lines were run and estimates prepared, resulting in the final adoption of the lines shown in the accompanying plan and profile. The line A, with its long tangent, 48 min. curve and uniform grade of 0.27 per cent, is the ideal line, but it does not connect with the old line at Cunningham and is only considered as a part of the further improvement extending to the north. The same is true of line B, except that it provides an alternate location at the south end with smaller quantities of excavation. The line C, with easy grades and curves, connects with the old line at Cunningham, and since the fill required for this line forms a part of the big fill necessary on line A, as shown in the cross-section, line C can be considered as one of the stages in the construction of the ultimate line. The double track fill on line C between Culmerville and Cunningham contains about 1,600,000 cu. yd.

The reduction in northbound grade which will be secured in the construction of line A and its proposed extension to the north, together with similar reductions that can be made at several other points, will make possible the operation of northbound freight trains under the pusher system, instead of double-heading as at present, thereby materially reducing the engine mileage. This possible advantage is increasingly important as the development in the coal mining industry between North Bessemer and Culmerville proceeds, considerably increasing the amount of northbound freight traffic.

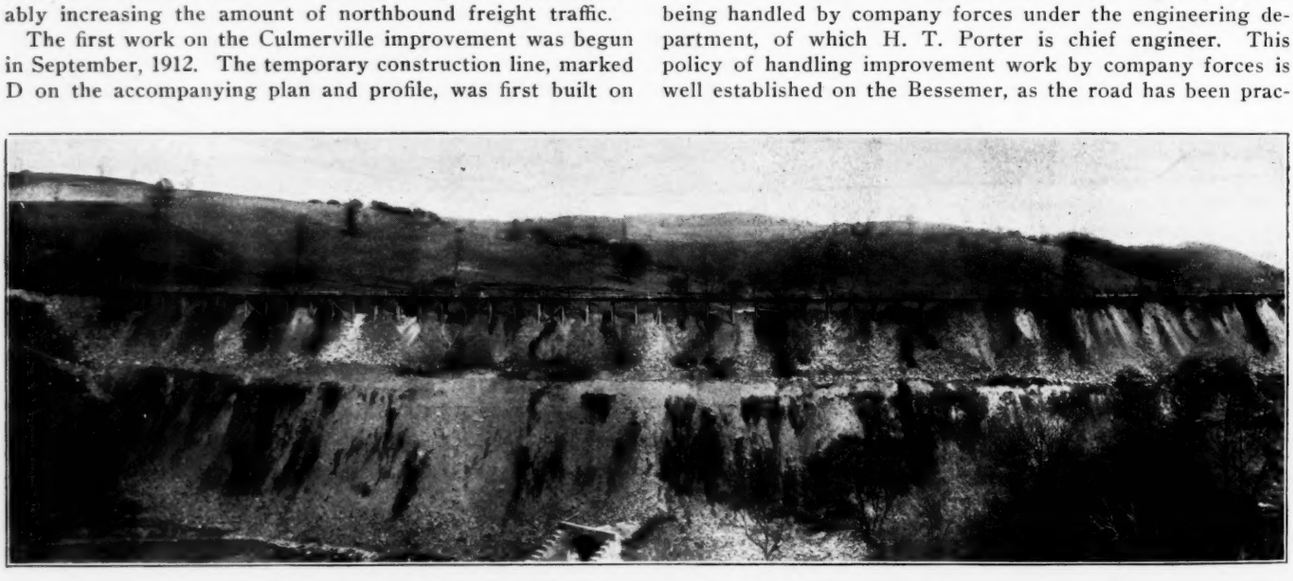
The first work on the Culmerville improvement was begun in September, 1912. The temporary construction line, marked D on the accompanying plan and profile, was first built on a 3 per cent. grade from the old line to the south end of the low level trestle. This trestle, which had a maximum height of 70 ft., consisted of four-pile bents braced in towers and built of long-leaf yellow pine for the longer pieces and of maple or native wood for lengths under 40 ft. This first trestle was connected up September 25, 1912. Meantime, work had been under way on the construction of the 26 ft. arch 716 ft. long which carries Bull Creek under the new fill, and an 8 ft. arch 678 ft. long which carries a small tributary creek just south of the larger one.

The first trestle was filled by April, 1913, and a second trestle on the same level was started in June and connected up in August. This trestle was filled by November and during the winter the work of spreading between these trestles and jacking up the tracks about 10 ft. was continued. In the spring a high level trestle 45 ft. high was driven in the dump on the line C, being connected up in April, 1914. This trestle was filled by June and since that time work has continued in spreading on both the upper and lower levels within the limits of the big fill. The work on the upper level is calculated to provide a temporary uniform grade of 0.75 per cent, the same as the northbound grade on the old line, so that an alternate line will be ready for operation for through trains at any time that it may be needed. The next step will be to raise this level to the grade of line C, and when the complete development to the north is authorized the fill can then be raised to the grade of line A.



A Side View of the Second Trestle on the First Bench Showing 26-ft. Arch Carrying Bull Creek and the Old Viaduct in the Background

All of the work in connection with this improvement is being handled by company forces under the engineering department, of which H. T. Porter is chief engineer. This policy of handling improvement work by company forces is well established on the Bessemer, as the road has been practically double-tracked in the last eight years by that method with complete satisfaction to the company's officers. The Culmerville work required an average force of between 125 and 150 men and a maximum of about 200. The filling gangs consisted of from 30 to 50 men, the foreman of each gang reporting to a general foreman in charge of the work train and the unloading of material, who reports to the engineer of track. Similarly, the foremen of trestle and concrete gangs report to a general foreman, who in turn reports to the engineer of bridges.



Panorama of Big Fill Near Culmerville During the Filling of the Temporary Trestle on the Second Bent

The filling material is brought in full trainloads by road crews who set it out in sidings along the old main line and pick up a load of empty cars that have been placed in these sidings to go north to Conneaut Harbor for ore in the summer or back to the mills for refuse, or to the mines for coal in the winter. About 125 cars of material are received daily on this work. The loaded cars are handled from the sidings along the main line down to the dumping trestles and the

Looking Along the Fill Over the First Temporary Trestle. Second Trestle on First Bench at Right and Old Viaduct at Left

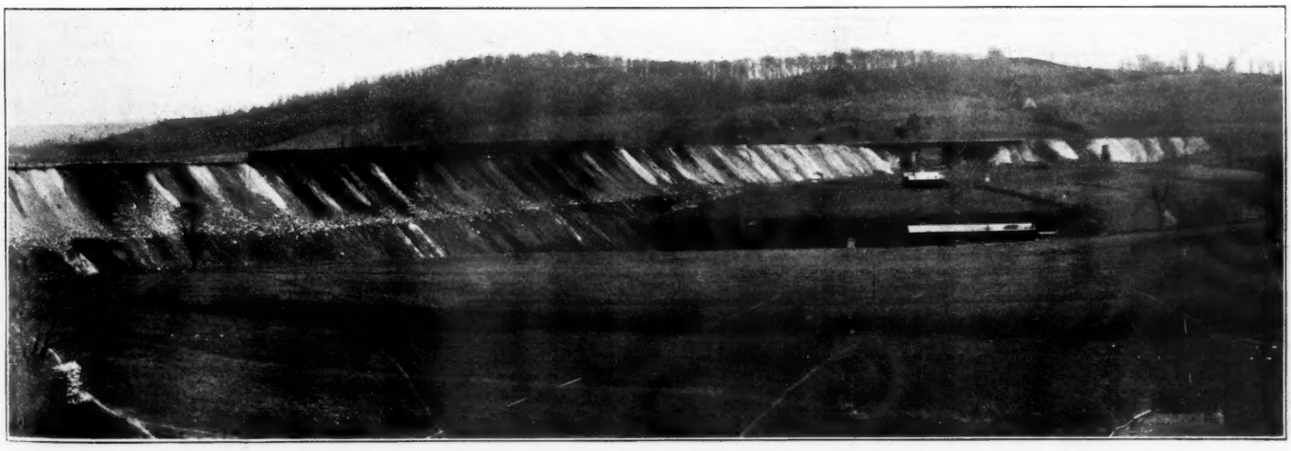
empty cars are handled back to the sidings by one work engine. Additional storage tracks, with a capacity of about 85 cars, are provided along the construction line D for storing loads and empties.

During the filling of the two low level trestles and the spreading between these trestles, all loads were handled over the construction line D, approaching the dumping trestles from the south, and the empty cars were removed by the same route. On the completion of the upper level trestle a construction track was laid to connect the north end of this trestle with the old line near Cunningham and the loads were then handled to this upper level from the north end and the empties removed at the south end. More than 50 per cent of the material must be shoveled from the cars as the engineering department has no control over the class of cars in which the refuse is loaded. In order to keep down the dust during this unloading, water tanks, which are filled by pumping from the creek below, were located along the approaches to the trestles and all material is wet down as the cars are pushed slowly past the tanks. In addition to the two concrete arches carrying the creeks under the big fill, a 26 ft. arch 311 ft. long is required to carry a highway near the south end of the fill, a 6 ft. arch 220 ft. long carries a small stream under this highway, a 6 ft. arch 174 ft. long was required just north of Culmerville, and a highway crossing was also built near Culmerville. The total yardage of concrete required for these structures was 18,970. All of these structures are of mass design.

The two creek arches under the big fill, which contained over 12,000 cu. yd. of concrete, were placed from a mixing plant located near the viaduct on the old line. The concrete materials were dropped through the viaduct into storage bins feeding to a one-yard Smith mixer. The mixed concrete was elevated to a bin holding two batches, from which it was dumped into a one-yard car running on a small trestle built over the arch forms the full length of the culvert. This car was operated by a cable and hoisting engine and could be dumped at any desired point along the work.

FELT TIE PADS

Tie pads of felt, which are used to some extent on European roads, are being tested by the New York Central, the Pennsylvania, and the New York subway. These pads are manufactured by the Q & C Company, New York, of imported cow hair, which is saturated with a special tar. They are made in three thicknesses, one, two and three-ply, the latter being about ½ in. thick. They are placed between all tie plates and the ties to absorb the shock, preserve the tie and particularly in terminals, to eliminate the noise. The thinnest pad is generally used in Europe, where one company that has used several million per year, reports that its ties when so protected last one-third longer. The pads are made about ⅛ in. smaller all around than the plates to improve the appearance, as the edges would become ragged if they projected beyond the metal plates.



Panorama of Big Fill Near Culmerville During the Filling of the Temporary Trestle on the Second Bent

The New York Central installed a number of these pads in April, 1911, on tracks in the Grand Central Terminal, in which the rail is carried on wooden blocks imbedded in concrete. Smooth bottom tie plates are used and the rail is held in place with screw spikes. The first pads used were two-ply, but later installations have been made with three-ply pads in order better to absorb the shock. The first pads installed are reported to retain their ability to perform this function and these pads have not shown much evidence of wear.

Raising and Shifting a Six-Track Main Line

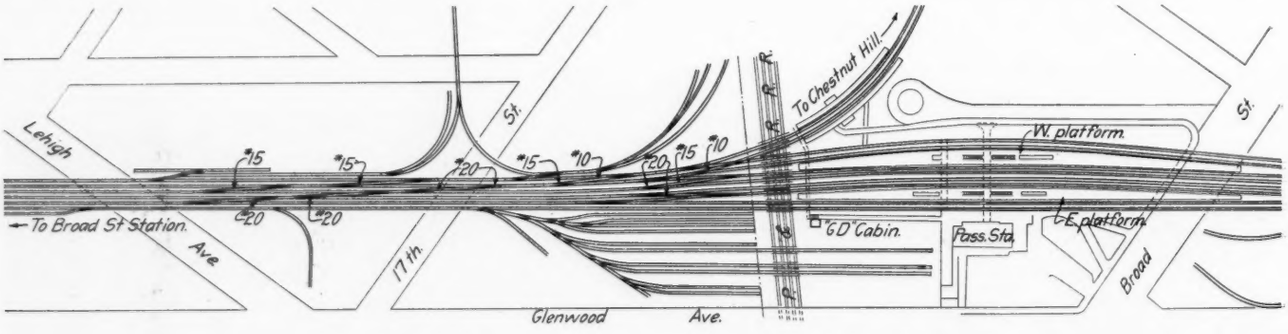
A Description of the Manner in Which the Track Work Was Handled Under Traffic on a Very Busy Road

By W. F. Rench
Supervisor, Pennsylvania Railroad, Tacony, Pa.

In addition to the interesting structural and architectural features of the improvements now being made by the Pennsylvania at its North Philadelphia station, which were described in the *Railway Age Gazette* of April 3, there were many and varied problems presented to the maintenance department for solution during the progress of the work. Thus, although the improvement extended over but one mile of line, it included typical problems of alinement, grade, switch connection and bridge adjustment, and involved the raising of a six-track main line system and numerous connecting yard tracks under a heavy traffic.

The object of the improvement was three fold: First, an increase in facilities by providing an additional track for passenger traffic in each direction with high island platforms and an additional drill track on each side of the main track layout, the one on the westward side being used also as a freight running track; second, the reduction of the grade at the station from 0.7 per cent to 0.3 per cent to eliminate delays caused by the difficulty of starting the heavier trains on the former grade; and third, the necessity of renewing three bridges in this section which were inadequate to carry the increasing train loads.

The ideal maximum grade on the division is 0.6 per cent. By the use of this grade west of the station between Seventeenth street and the crossing of the Philadelphia & Reading, with a vertical curve directly over the P. & R. bridge, the increased depth of floor system required for the new bridge at the latter point was secured. The 0.3 per cent grade adopted for the greater portion of the station platform length provided the greater depth of floor necessary for the new bridge over Broad street and supplied some additional headroom for the street. The continuance of the 0.6 per cent grade east of Broad street connected at Allegheny avenue with the opposing grade of 0.1 per cent by a long vertical curve caused the greatest problem in the whole elevation. The maximum change in grade was 3 ft. 10 in., and the average 3 ft. The existing bridge at Germantown avenue was raised to the new grade and later renewed and the Twelfth street bridge was encased in concrete to carry the deeper roadway.



The New Track Layout of the Pennsylvania at North Philadelphia

The raising of the main and yard tracks was an interesting problem for the maintenance department on account of the density of traffic. The week day passenger schedule included 200 trains every 24 hours, one-half of which moved between 7 a. m. and 5:30 p. m., during the working day. The freight traffic which was handled almost entirely upon the inner tracks amounted to 15 trains in each direction during the same period. Some of the more important freight trains were run upon the outer tracks, but generally at times when the greatest intervals occurred between passenger trains.

The extent of this traffic practically precluded any raising of those tracks on week days except that on No. 4 track between the hours of 6:30 a. m. and 8:30, two one-hour open periods occurred which were duly utilized. The Sunday schedules not only carried one-third fewer trains, but also had longer open periods. These were necessary to provide the opportunity not only to make a substantial lift, but also to unload on the main tracks the material necessary for the raising.

The yards shown on the accompanying drawing are in constant use on week days for a very heavy local business and for the considerable traffic at the grain elevators, but are idle on Sundays. For this reason Sunday was also the only day when certain of these tracks could be raised.

Gangs furnishing a total of 100 men for the main tracks and 60 for the yards were used for this Sunday work, a different lot of men being used on alternate Sundays. An itinerary was planned for the work train which provided for periods varying from 30 to 45 minutes successively upon No. 4 and No. 1 tracks as opportunity offered and at other times in the yards on either side, care, however, being always taken to utilize intervals in the late afternoon for dumping material necessary to back fill the main tracks which had been raised during the course of the day. These movements were facilitated by the presence of crossover switches at each end of the work.

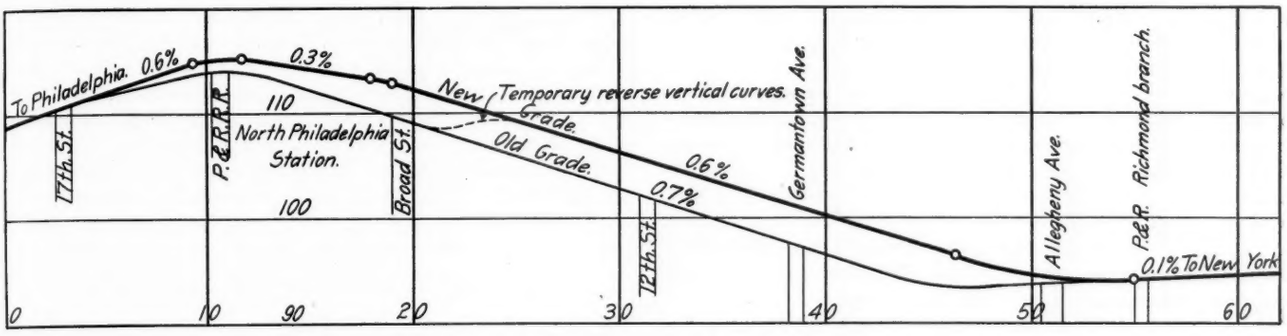
During the time that actual raising was in progress all trains were slowed by flags, to which attention had been drawn by a general notice. Upon completion of the day's work the tracks were left in fit condition for regular service and at no time was any speed restriction laid by order, nor was any necessary.

The aim of each Sunday's work was to attain an average raise of one foot through a half mile of both passenger tracks, which with the settlement from traffic of the following week netted about 9 in. of permanent lift. The operation on week days consisted mainly of moderate raising of the freight tracks also under protection of a flag and of the yard tracks whose use could be spared and of such surfacing of the tracks already raised as might be necessary.

The usual consumption of material was about 7 cars each week day and 18 cars on Sunday. In all, 610 cars of cinders and 155 cars of stone were required for the work. The material was all supplied in hopper bottom cars, which greatly facilitated the unloading.

The grade of the main track system had to be adjusted to the

grade of the yard and elevator tracks connecting with it. A crossover was projected between tracks 4 and 5 just west of Twelfth street. This crossover, however, would have prevented the separation of grades between tracks No. 4 and No. 5, which was the only means possible of connecting No. 5 track with the yard tracks without increasing the grade of the latter beyond the allowable maximum which already existed. A solution to this problem was found by moving the crossover to an almost equally satisfactory location near Broad street. An 0.8 per cent grade was then established for No. 5 track, between Broad street and the junction with the yard track near Twelfth street. This



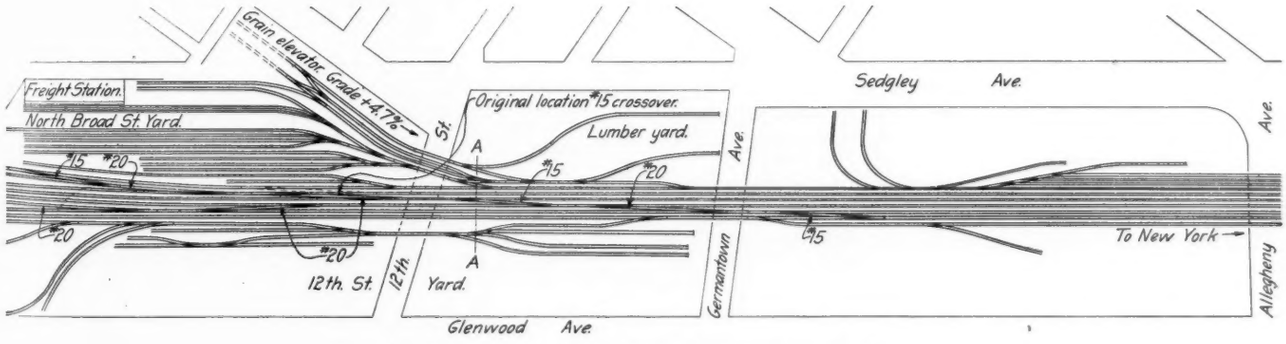
Profile of Grade Revision Through North Philadelphia Station

distance is just half the maximum train length and by using a 0.6 per cent grade eastward from that point the resultant grade for the maximum train length was kept at 0.7 per cent, which was considered the maximum permissible for this track, which is used rather frequently as a freight running track.

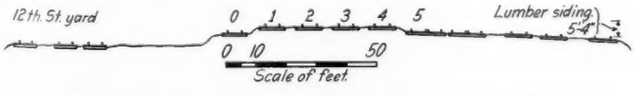
This separation of grades between tracks No. 4 and No. 5 required that the latter should be as much as 20 in. lower than No. 4, but as this is little more than the depth of standard shoulder it has worked no disadvantage from the standpoint either of operation or maintenance. The No. 0 track was also placed 20 in. below the main track grade, and this arrangement was of very great advantage in establishing proper connection with the various yards and industrial sidings, many of which were on trestle work. No greater grade than 2 per cent was required, and all intersections were provided with suitable vertical curves.

A special problem was presented in the raising of the four-track bridge carrying yard tracks across Twelfth street. The elevation of the southerly track on this bridge was fixed by the connection which this track makes with the main line immediately east of the bridge. A similar elevation on the northerly track would have required a grade of 4.7 per cent on the lumber yard lead. As the business of this industry amounts to about 600 car loads per year this siding connection could not be lost, and it was finally decided that a moderate downward inclination of the bridge toward the north could not introduce any great disadvantage either in operation or maintenance, and would allow the northerly track to be lowered enough to secure a 2 per cent grade instead of the 4.7 per cent.

The realinement of tracks to establish the reverse curves, made necessary by the widening of the main track system at the station platforms, involved the substitution of a No. 7 frog for the original No. 8 in track No. 3 and of a No. 10 in track No. 2 to keep the resulting curvature at both ends of the new crossover essentially that of a No. 8. Realining of track No. 1 through the No. 15 crossover required one end of the crossover to be changed to a No. 24 to render the resultant curvature the same as that of the original No. 15, and thus permit the continuation of the 30 mile per hour speed limit through the crossover. These two cases illustrate the advantage of combining odd numbers in the same crossover when occasion demands.



The New Track Layout of the Pennsylvania at North Philadelphia



Cross Section on Line A-A in the Accompanying Plan

The operation of shifting the two Chestnut Hill branch tracks to their new positions on the new bridges 32 ft. north of the old location and of shifting one of the passenger platforms which forms a part of the improvement, was carried on by a special organization. The westward traffic on this branch, excepting one train which was run against traffic, ceases at 11.20 p. m. Two gangs of men were employed for this work, one working from 10 p. m. until noon and the other from 6 a. m. to 8 p. m. The westbound track was laid during the night, while there was no traffic, and in the morning both eastbound and westbound movements were made over the one completed track, while the relocation of the eastbound track and platform was carried on.

Although it would have been possible to establish a circular curve between the Philadelphia & Reading and the Sixteenth street bridges, it was decided to increase the curvature at the platform in order to continue a curve of larger radius at Sixteenth street, the curvature gradually increasing from this point

to the platform. This arrangement is of benefit to operation as the trains naturally go into the station under some headway which must gradually be reduced to a stop. The curvature varies inversely as the speed, giving the curve somewhat the form of a parabola.

On account of the complicated layout between Seventeenth street and the P. & R. bridge, special care was necessary in shaking out the switch connections and the new curves on the Chestnut Hill branch and the interchange sidings. A drawing was prepared with extreme accuracy to a scale of 32 ft. to the inch, using very thin lines for the tracks. From this drawing dimensions were scaled as required, the result being very satisfactory. The detailed lining of the various curves as well as of the connections was obtained by the use of a string.

Although the force of signal men and track men frequently reached as high as 250, and these men were required to work on tracks which were handling 40 branch line passenger trains in addition to the 100 main line trains, 35 freight trains and almost continuous drill movements on No. 0 and No. 5 tracks, the work was accomplished between March 5, 1913, and September 1, without a casualty of any kind. This was attained not by slowing down the traffic, but by unceasing vigilance and fidelity to established rules of safety. The work was carried out by close co-operation between the chief engineer's organization and that of the division superintendent.

COMPARATIVE TESTS OF BUMPING POSTS

A series of comparative tests of car stopping devices was recently conducted in Chicago by two important trunk line railroads. The report covering the first cost, cost of installation and relative efficiency of these devices, as indicated in the tests, has just been completed, and is abstracted below.

Eight devices were selected for test, representing, as far as practicable, the three general groups in use. Three different principles are used in the design of these three types, as follows: First, blocking the wheels of a car, the arrestive force being transferred through the center pin and center fastenings to the car body; second, direct contact of the car coupler with a solid object, the blow being transferred directly to the frame of the equipment and the stopping device; third, the same as the preceding, except that some portion of the momentum is absorbed by the device. In these tests the first and third groups were represented by one device each, the remaining six being classed in the second group.

The method of testing, as decided upon by representatives of the companies furnishing the devices, was to allow 10 loaded cars rolling free to strike them at a speed of 10 miles an hour. In the first test the number of cars was reduced to 7 and the velocity developed amounted to 7.2 miles an hour. The result of this test was so disastrous that all later tests were made with one loaded car rolling free striking the device at a velocity of from 6 to 8 miles an hour.

The results cannot be considered conclusive, as in all cases the tests were too severe, either destroying the devices or damaging them so badly as to make them of no further service without heavy repairs, except in two cases in the second group, in which there is little doubt that if a second trial had been made they also would have been seriously damaged.

The showing made by the device in Class A indicates that the principle upon which it is designed, namely, stopping the wheels, is wrong. While the wheels may be successfully stopped, the strain on the castings and center pin from the momentum that may be developed is too great to stop the car without some destructive action. In the design of devices in Group B, no provision is made for the motion of the device after it is struck by the car, and the devices have not sufficient strength to resist the great shock which at times they may be required to take up. Even if this strength were provided the shock would manifestly be too severe upon the equipment. The tests indicate that better and safer results will be obtained in switching yards by placing something in front of the device, such as an earth mound, for example, to partially absorb the blow caused by the contact of the car and the stopping device. While the device in Group C is more nearly correct in principle, the tests showed it to be structurally weak, and, although reliable figures are not obtainable as to the cost of its construction and installation, it is evident that, at best, the results obtained are out of proportion to its first cost and maintenance.

The report calls attention to the need for a device that will combine in its design and construction the ability to absorb the blow delivered in general switching service without endangering the equipment. It is recognized that this result cannot be attained at the prices now paid for stopping devices, but it is evident that the decreased cost of maintenance would warrant a much larger expenditure in first cost for such a device than the prices now currently paid.

In order to get comparative costs, all of the stopping devices were installed by the same men and as nearly as possible under the same conditions. The original cost varied from $45 to $60, and the cost of installation from $6.25 to $11.55. Eliminating the first test the impact in foot tons per second developed varied between 552 and 880.

THE ROADMASTERS' CONVENTION

The thirty-second annual convention of the Roadmasters and Maintenance of Way Association of America will be held at the Auditorium Hotel, Chicago, on September 8-11, inclusive. The widespread interest in the work of this association indicates that this will be one of the most successful conventions in its history and a large attendance of roadmasters and supervisors is expected. The following is the program:

TUESDAY MORNING, 10 A. M.

Convention called to order by President T. F. Donahoe.

Addresses of welcome, on behalf of the city of Chicago, by Mayor Carter H. Harrison; on behalf of the railroads by W. G. Bierd, president, C. & A., and R. H. Aishton, vice-president, C. & N. W.; on behalf of the Track Supply Association by President Walter H. Allen.

Three-minute addresses by past presidents.

AFTERNOON

Reading of committee reports and general discussion.

WEDNESDAY MORNING, 10 A. M.

Reading of committee reports and general discussion.

AFTERNOON

Reading of committee reports and general discussion.

THURSDAY MORNING, 10 A. M.

Reading of committee reports and general discussion.

AFTERNOON

Reading of committee reports and general discussion.

FRIDAY MORNING, 10 A. M.

Election of officers.

Reading of committee reports and general discussion.

Among the subjects on which committee reports will be presented are: New and improved manual and power driven track tools; the proper organization and economical use of labor and material for safe maintenance of track; the proper method of rail renewals; the proper type of track accessories, and cleaning and policing the right of way from the standpoint of safety and economy.

The third annual banquet given by the Track Supply Association will be held in the Auditorium Hotel on Thursday evening. Among the speakers will be A. W. Thompson, vice-president of the B. & O.; A. T. Hardin, vice-president, N. Y. C. & H. R.; E. F. Wendt, member, Board of Valuation Engineers, Interstate Commerce Commission, and T. F. Donahoe, president of the Roadmasters' Association.

The Track Supply Association will hold its annual exhibit at the same time and present indications are that the number of exhibitors will exceed even that of last year.

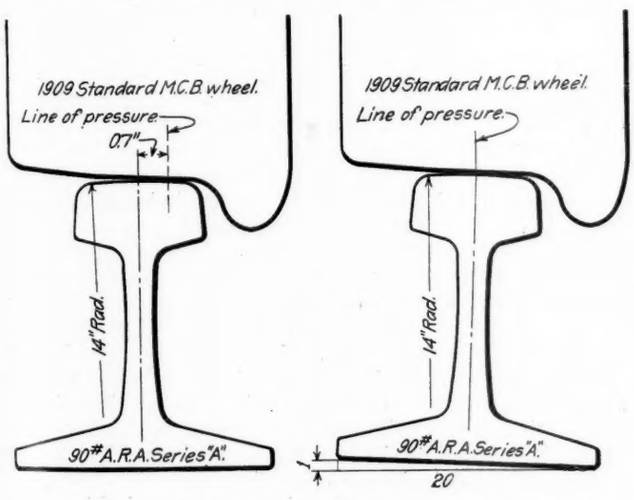
Recent Tendencies Regarding the Canting of Rails

A Discussion of This Subject with a Resume of the Practice of Twenty-four Representative Roads

The rail problem has become one of primary importance within the past few years and all classes and causes of failures have been carefully studied. Prominent among the types of failures is that termed "head" failure, which includes nearly 50 per cent of all failures. Among the contributing causes of head failures is the unsymmetrical loading of the rail. The A. R. A. sections now widely used have a radius of the top of the head of 14 in. The present standard coning of car wheels is 1 in 20. As a result, the line of contact of a *new* wheel on a *new* rail is about ¾ in. from the center of the rail on the gage side. The application of the wheel load to the rail at this point, therefore, introduces shearing and bending stresses in the rail in addition to the direct load.

To overcome this unsymmetrical loading it has been suggested that the coning of the wheels be reduced or eliminated altogether. The New York Central & Hudson River has recently reduced the coning from 1 in 20 to 1 in 38, while several prominent railway men have advocated eliminating this coning entirely. (See article entitled "Rail Failures Due to Eccentric Loading," by C. A. Morse in the *Railway Age Gazette*, April 19, 1912.) However, this latter suggestion meets with the active opposition of the mechanical department, which has found that the wear of wheel flanges and the accidents resulting from worn flanges have increased rapidly in the few instances where coning has been eliminated.

Another suggested remedy is to cant or incline the entire rail to the standard angle of wheel coning, in this way securing a contact with the wheel over the center of the rail. This practice is common in Europe, but has not been widely adopted in this country. The canting of rails is not, however, a new idea in this country, as it has been practiced to a considerable extent by track men for many years. There is a natural tendency for a rail to cant or "roll outward" under traffic, and experienced

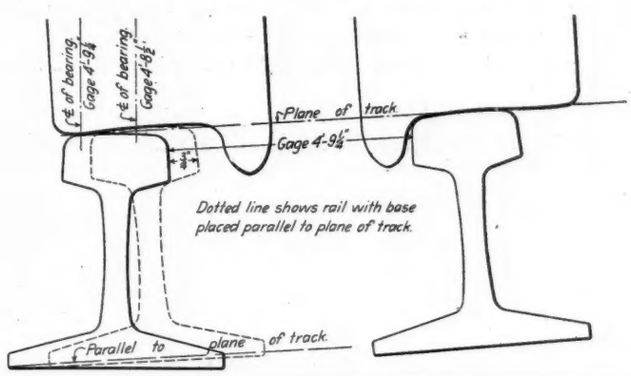


Contact of New Wheels on New Rails When Rails are Vertical and Canted

track men have inclined the rail inward slightly when laying for many years to offset this tendency and also in the belief that the rail remains closer to correct gage.

Theoretically, this practice has considerable to commend it, especially on tangents and on the high side of curves. Practically, however, there are several more or less serious objections to it. It will be admitted without question that the inclining of the rail to permit the application of the load over the center of the rail is to be desired, especially when the rails are stressed to their present high limit. The heavy wheel loads and dense traffic of the modern railroad are justifying numerous refinements in track construction and maintenance which earlier railroading practice would not warrant, and the advocates of rail canting believe that this practice comes within this category. Those men who do not believe in the canting of rails are opposed to it because of the practical difficulties encountered in working this out rather than in the merits of the plan itself, believing that, at present, at least, these difficulties out-weigh any advantages which would be obtained.

The full benefits from canting rails are secured only with new wheels on new rails, while in service both wheels and rails are soon worn from their true contour. Also no matter how well a road may maintain the wheels under its own equipment, the large number of foreign cars which must be handled and which will not be in as good condition, tends to remove the advantage. Without tie plates the inclination must be given to the rail by adzing the ties. At the present time nearly all the ties are adzed by hand. It is difficult to secure even adzing when providing a level rail seat, and the difficulties are materially increased when the ties are adzed at a slope and to one uniform slope. Therefore, it is difficult, if not impractical, to cant rails without using tie plates. Where plates are used the desired slant can be given


℄ of bearing Gage 4-9¼"
℄ of bearing Gage 4-9⅛"
Plane of track
Gage 4-9¼"
Dotted line shows rail with base placed parallel to plane of track.
Parallel to plane of track.

Effect of Canting of the Low Rail on a Curve and Wide Gage in Throwing the Wheel Contact to the Outer Edge of the Head

in the plate while the bearing of the plate on the tie is horizontal. However, with inclined tie plates it becomes necessary to tieplate all ties continuously instead of spotting them in on new or treated ties as is customary on many roads, and it introduces torsion stresses in the rails at the joints where Continuous, Weber, or other base supported joints are used. The canting of rails also introduces torsion in the rails at switches, crossings and other special work where the rails must be vertical.

On the low side of curves the canting of the rail introduces a special problem essentially different from that existing on tangents or on the high side of curves. To secure the proper superelevation, both rails are normally inclined towards the center of the curve. In canting the low rail, part or all of this inclination is removed and the line of contact of the wheel with the rail is thereby thrown towards the outer edge of the head. This condition is further aggravated by the wide gage commonly found on curves, permitting the more or less prominent false flanges of the worn wheels to run on the rail. One of the accompanying drawings made from actual contours secured on the track shows this condition. The concentration of the load on the outer edge of the low rail increases the tendency of the rail to roll out, one of the things that the canting is intended to correct. Furthermore, with the load applied at this point, especially under slow trains with frequent slipping of the locomotive drivers, the head of the rail is soon ground parallel to the plane of the track while

the flowing of the metal is materially increased. For these reasons the canting of the low rail on curves can hardly be considered advisable, even though it may be the practice to cant both rails on tangent and the high rail on curves.

Because of the differences in practice and in opinion regarding the advisability of canting rails, we give below the practice and the opinions of 24 representative large roads on this subject:

On the New York Central & Hudson river it is the practice to cant the rails when laying by adzing the ties and by the use of inclined tie plates. The rail is inclined about ⅛ in. in 5½ in., or about 1 in 40. In this way the rails receive the maximum bearing from the wheels, while very little additional labor is required since it is necessary to adze the ties whenever rail is relaid. It is believed on this road that the results secured from this practice more than warrant this extra work and expense.

The Canadian Pacific strongly favors the canting of rails and for the past four or five years has been purchasing shoulder tie plates ½ in. thick at the shoulder and ⅜ in. thick at the opposite side of the rail base, giving an inclination of 1 in 40. It is believed that this practice tends towards smooth running, and also to prevent the nosing of locomotives and the oscillating of cars from one side to the other. It is found that the head of the rail takes its wear nearer the center than formerly, but it is believed that even better results will be obtained by increasing the inclination to 1 in 20, as is standard on European roads.

On the New York, New Haven & Hartford rails are "rolled in" slightly when laid and when regaging track, although it is not the standard practice to cant rail to any considerable extent. A new design of tie plate has been made providing for canting the rail about 1/16 in. in 5½ in. This plate has been adopted only tentatively and it may be found after experimental use that it will be advisable to increase this to ⅛ in., equivalent to a slope of 1 in 40.

The Southern Pacific uses a flat bottom tie plate 8½ in. square on both tangents and curves. This tie plate is ½ in. wider on the outside of the rail than on the inside to offset the tendency of the rail to roll outward. While it is not the standard practice on this road to cant the rail, it is frequently necessary to regage the track on sharp curves, and in such instances it is the practice of the track men to cant the rail inward slightly. For this reason this road is inclined to favor a beveled tie plate for use on medium and heavy curves, thereby slightly canting the rail at those points.

While the Philadelphia & Reading does not now cant its rails, it is expected that ultimately this will be the practice and that tie plates will be rolled accordingly. It is believed that the ratio of the slope of the rail should be at least as great as the coning of the wheel, although this ratio is now somewhat indefinite due to the present transition in the rate of coning of wheels.

About six years ago the Baltimore & Ohio purchased a considerable number of tie plates tapered ⅛ in. in 5½ in. for use exclusively on curves. While good results were secured from these plates, their use was not extended. It is believed that some beneficial results will be obtained in canting the rail in by bringing the wheel bearing nearer the center of the head of the rail, by overcoming the tendency of the rail to turn outward, and also by giving the tie plate a greater thickness at the outer edge of the rail base where the greatest strength is required. Practically, however, it is believed that the benefits derived from the use of inclined tie plates is very much reduced with the hand adzing of ties.

The Delaware, Lackawanna & Western has never canted its rail, and it is at the present time adzing all ties so that the flat tie plates will have a uniform horizontal bearing. However, the advisability of canting rails when laying has been more or less seriously considered and this road has arranged for the purchase of a small number of Lundie tie plates for use on the new cut-off north of Scranton. It is believed that this practice will materially assist in preventing rails from rolling out, although this road has had no experience to back up this opinion.

For several years it has been the practice of the Chicago, Burlington & Quincy to purchase an inclined tie plate, but for the past year this road has been buying flat tie plates for the lines west of the Missouri river, while still using inclined tie plates on the lines east of the river. One of the serious objections to the use of inclined tie plates on this road is the difficulty encountered at switches and crossings where the rails must be vertical. The use of the canted tie plate is being continued on the lines east, primarily, in order to have all the tie plates uniform.

The Missouri Pacific uses tie plates canted to a slope of 1 in 80 on curves. The canting of the rail to a slope of 1 in 20 is not regarded with favor and since the majority of the wheels in actual service are worn to a coning other than standard, it is believed that the canting of rails to this angle would result in heavy wear on the outside of the head.

The practice of the Union Pacific has never been to cant rails when laying, although this subject has been discussed to some extent. Considering the mechanical difficulties in laying track with present methods, it is doubted if any decided benefits will be secured by canting the rail.

It is not the standard practice on the Minneapolis, St. Paul & Sault Ste. Marie to cant rails when laying. However, recently in laying some new 85-lb. rail, mainly on old ties where the inside rails on curves had been turned over somewhat by a heavy, slow traffic and where there were no tie plates, the outside edge of the base had cut into the ties badly. When laying the new steel the roadmaster adzed the ties to give the low rail on curves a cant to overcome this tendency to over turning. As tie plates were then applied the rail has remained in this same position. Later investigation has shown that this canting has been one of the contributory causes for the flowing of the metal on the outside edge of the low rail, although the wide gage on the curves is the most potent reason for this condition. This flowing is also a result of the fact that fully 75 per cent of all wheels passing over the rail have tires which are more or less grooved and the rim of this depression has a more serious action on the edge of the head of the rail when it is canted than when it is vertical. Because of the many difficulties preventing securing a perfect contact between the rail and the wheel, the road is of the opinion that no benefit is secured from canting the rail.

It was formerly the practice of the Chicago, Milwaukee & St. Paul to use beveled tie plates on curves to cant the rail toward the center of the track, but this practice was abandoned when it was found impractical to apply them so that the rail would not be canted through a portion of its length and level, or canted in the opposite direction, at other points, thereby creating undue stress in the rail. It is not now the practice to cant the rails when laying them, although when relaying rail the ties are adzed slightly deeper on the inside of the rails than on the outside for the purpose of lengthening the time before the rails turn out because of traffic rather than for the express purpose of canting the rails in. Tie plates are now used on all soft ties and on all oak ties on curves on line carrying a considerable traffic. Where the tie plates are used very little trouble is experienced in rails canting out or the gage widening.

It is not the practice of the Chicago & North Western to cant the rails when laying them, although a recent investigation showed that most steel gang foremen and roadmasters were giving the rail a slight inclination. Recent instructions provide that the rails shall be laid on a level bearing.

It is not the standard practice of the Pennsylvania Lines West of Pittsburgh to cant rails when laying them. While the inclination can be given the rail by adzing the ties to the desired angle, this is considered simply a makeshift. Until tie plates are applied continuously on tangents as well as curves the benefits derived from canting rails will be largely theoretical.

The Lehigh Valley lays its rail vertical on tie plates with the outside end extending further beyond the base of the rail than the inside for the purpose of overcoming the tendency of the rail to "roll out."

The Lake Shore & Michigan Southern uses sawed red oak ties almost exclusively, thereby making the canting of rail impractical without further adzing of the ties. It is believed that

the canting of rail has little to recommend it in practice on any individual road, since fully 90 per cent of the wheels are worn by service on rails laid vertically.

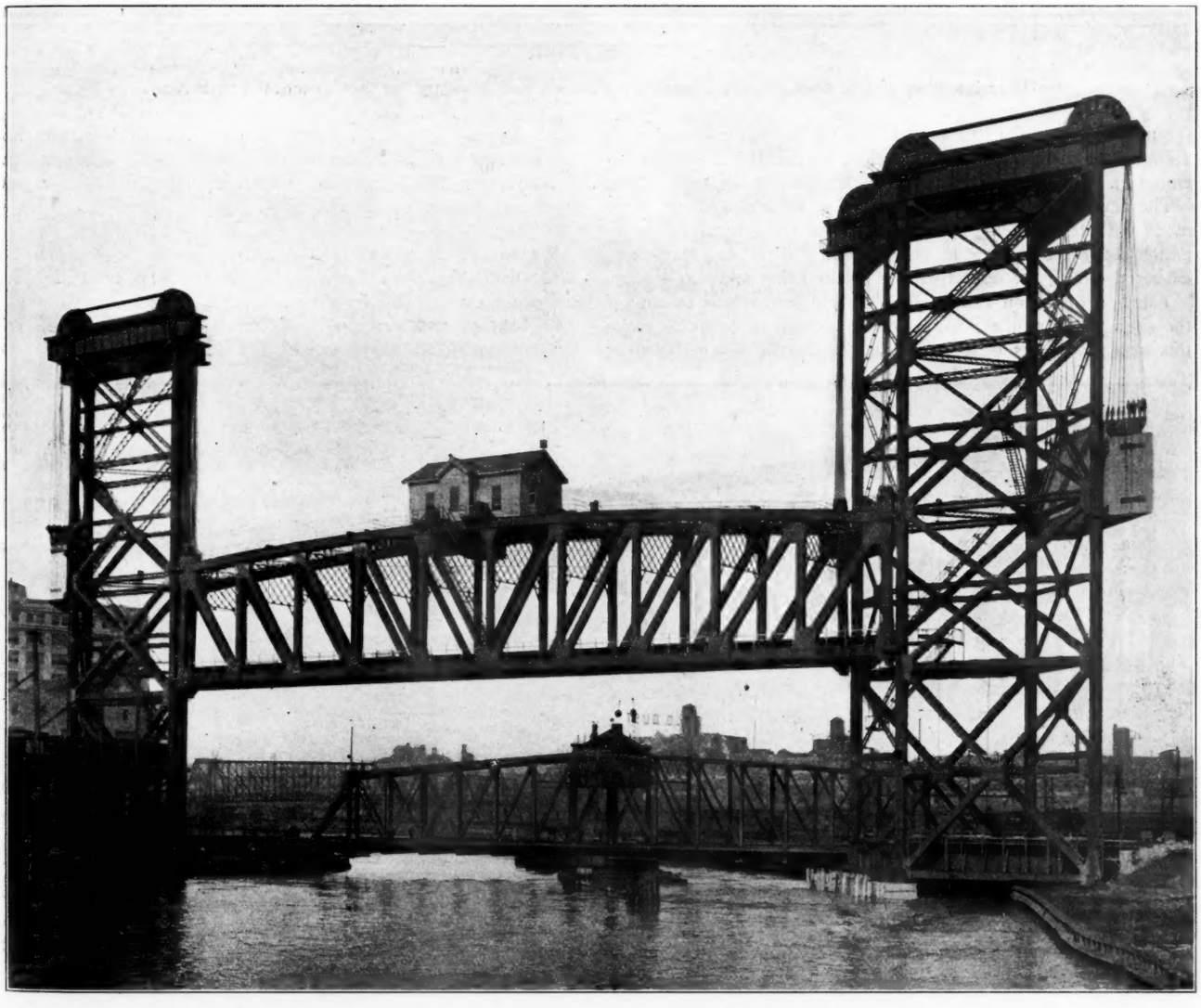
Among other roads which do not cant rail when laying are the Chicago, Rock Island & Pacific, the Seaboard Air Line, the Grand Trunk Pacific, the Southern Railway, the Pennsylvania Railroad, and the Louisville & Nashville.

REPLACING A SWING BRIDGE WITH A VERTICAL LIFT STRUCTURE

The new double track vertical lift bridge of the Pittsburgh, Ft. Wayne & Chicago and the Chicago & Alton over the south branch of the Chicago river a little less than two miles south of the Chicago union station was placed in service on July 29. As the old swing bridge, which was formerly in use at this point, extended under the new structure, one-half of the old bridge had to be removed before the new bridge could be lowered into position.

The old structure was a double track through pin connected revolving draw span on a stone center pier and wooden abutments. Its length out to out was 223 ft. 6 in. This bridge was put in service in 1883 and was reinforced in 1893. It was obsolete and did not accord with the latest government requirements as to channel width, making it essential to replace it.

The new bridge is of the vertical lift type, designed by Waddell & Harrington, Kansas City, Mo., with a movable span 272 ft. 10 in. center to center of end pins, which is the second longest span of this kind ever built. The ends of the span are skewed about 45 deg. The supporting towers at each end are 53 ft. 6 in. long, 29 ft. 6 in. wide and 195 ft. high from top of masonry to center of sheave wheels. The bridge has a clearance of 9 ft. above the water when closed and a maximum clearance when raised of 120 ft., requiring a lift of 111 ft. The clear river channel is 200 ft. The weight of the moving span, including tracks, machinery and machinery house, is about 1,600 tons. This weight is counterbalanced by blocks of reinforced concrete suspended from sheaves at the rear of the end towers. The moving span is carried by 64 2¼-in. steel cables, 16 at each corner, passing over the 15-ft. sheaves at the top of the towers.



New Vertical Lift Bridge Over Chicago River Replacing Old Swing Span Shown Below

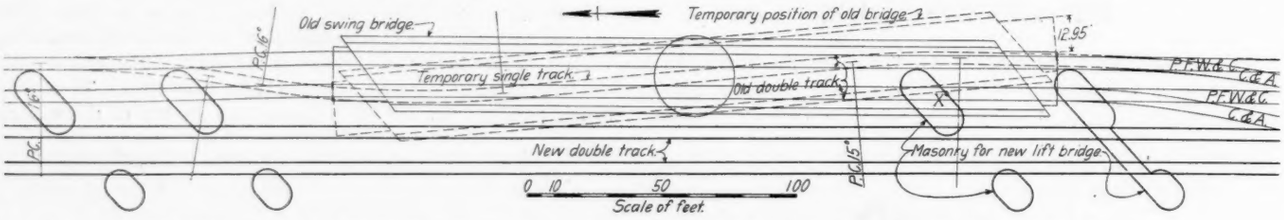
In erecting the bridge, the towers were built first and the movable span was erected by the cantilever method in the open position. Fan falsework was used to support the end panels of the lift span from the towers until the lower chord had been closed. The overturning tendency in the towers due to this method of erection was balanced by the counterweights. On account of the position of the old span it was impossible to lower the new lift span to the closed position until everything was in readiness for the operation of the new bridge and traffic could be diverted long enough to remove one-half of the old span and adjust the new bridge for operation. When the bridge

was finally lowered in position after cutting out the old span the error in grade and line was very small.

The accompanying sketch shows the original location of the swing span, the temporary position that was made necessary in order to clear the post of the new end tower at the point marked "X," and the location of the new bridge. The north end of the swing span in the temporary position extended too far west to allow the two tracks to be carried around the masonry for the new bridge and to clear the fan falsework supported from

The end of the remaining portion of the old draw span was jacked over about four ft. on the center pier in order to clear the new bridge. This allowed the new lift span to be lowered into position, adjusted, and traffic put back on the new structure. The south half of the old bridge was dismantled in place, being supported on falsework.

The design and the erection of the new bridge were handled under the supervision of R. Trimble, chief engineer maintenance of way, and J. C. Bland, engineer of bridges, of the Pennsyl-



Location Plan of Old Swing Span, Temporary Position and Masonry for New Vertical Lift Bridge

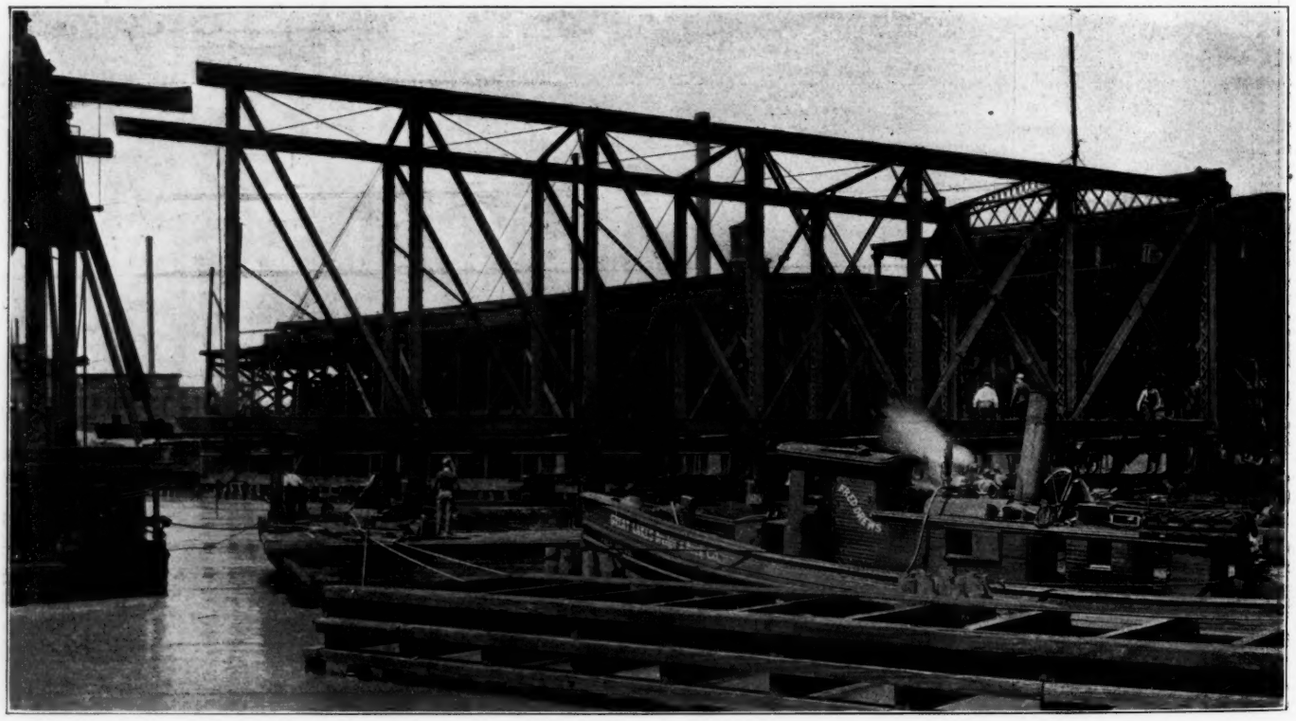
the north tower. On this account the bridge was operated with a single track during the construction period, the alinement including a 16 deg. curve, a part of which was on the swing span.

The new bridge being ready for service, all arrangements were made with the shipping interests to close the stream for navigation between 5 and 9 a. m. on July 29. The railroad traffic was detoured during the operation, the tracks being taken at 4 a. m.

The first operation in removing the old bridge was to cut off the skew panel at the north end of the span in order to make this arm of the bridge short enough to handle down the river

vania Lines. The Great Lakes Dredge & Dock Company had the contract for placing the masonry for the new bridge and the Pennsylvania Steel Company fabricated and erected the new span and dismantled the old draw.

Rolling Stock on the Italian State Railways.—On June 30, 1913, the Italian State Railways had in service a total of 10,261 passenger cars, 98,095 freight cars, 2,312 work and repair cars, 3,408 baggage and mail cars, 5,102 steam locomotives, 56 electric locomotives, 95 steam trucks and 51 electric trucks. There were



North Half of Old Span Supported on Scows and Completely Severed from the Rest of the Bridge

on scows. Two steel scows lashed together were placed under the north arm and blocking was placed under the floor beams. The water ballast in the scows was then pumped out by tugs and steam siphons until the weight of that end of the bridge was transmitted to the scows. Oxy-acetylene torches were used to burn off the truss members adjacent to the panel over the center pier and the north half of the bridge was then floated away. This portion of the old span was landed some distance down the river where it could be dismantled at leisure.

also 383 narrow gage cars, of which 224 were in Sicily and the remainder in Tripoli. During the fiscal year 1912-1913 there were constructed for the Italian State Railway 4,750 freight cars, 500 baggage and mail cars, 327 passenger cars, 160 steam locomotives, 51 electric locomotives, 17 narrow gage locomotives, of which 12 were for Sicily and five for Tripoli, and 197 narrow gage cars, of which 59 were for Sicily and 128 for Tripoli. All the new rolling stock was built in Italy, preference being given to Italian firms as an aid to national industry.

A Unique Method of Strengthening a Truss Bridge

Two Spans Carrying Tracks Over Faults in Rock Are Reinforced by Sinking Cylinders Under Panel Points

By Wm. H. Warnecke
Assistant Engineer, New York Central & Hudson River, New York.

In order to permit the operation of heavier motive power on the main line of the River division of the N. Y. C. & H. R. it was necessary to strengthen several bridges in 1912 and 1913. The original bridges on this division, the main line of which is the West Shore Railroad from Weehawken to Ravena, were nearly all reconstructed or strengthened between 1902 and 1904, to permit the operation of heavier motive power and equipment at that time. Several bridges which were stronger than the average of the original structures were allowed to remain at that time and were not strengthened. When the operation of still heavier locomotives became imperative, it became necessary to strengthen these few bridges which remained.

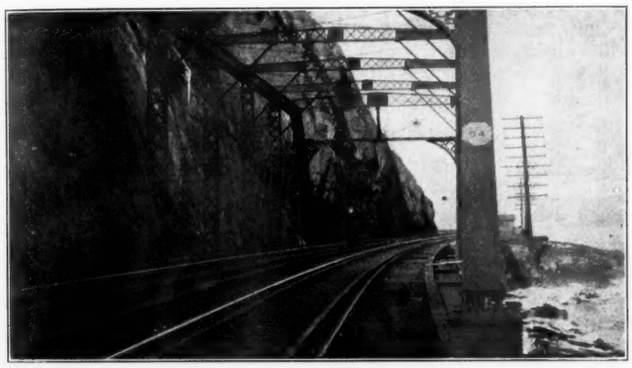


Fig. 1—Bridge No. 54

Two of these bridges, Nos. 54 and 56, located immediately south of Highland Falls station, are peculiar in that they were constructed to carry the tracks over transverse clefts in the rock bottom of the Hudson river, which it was found impossible to fill with safety, on account of the steep slope of the rock toward the center of the river. These bridges, which are placed close to the precipitous faces of the rock cliffs forming the shore, are double track, through truss spans, with two trusses each, of the pin-connected Pratt type, the length of spans being 135 ft. and 199 ft., respectively. The rock bottom on the in-shore side lies above the water level directly under the in-shore truss in each case for nearly the whole length of the bridge, and under the outside truss the water line extends only a portion of the length of the span, the end panels being located over dry bottom, which consists of boulders and gravel overlying the shelving bed rock. The bottom, which is under water at low tide, is overlaid with a considerable depth of soft mud.

In order to relieve the trusses from the full effect of the live loads, wooden blocking was placed under the ends of the floor beams wherever this could be done without going into the water at low tide, or on the soft bottom. In this way the in-shore ends of all floor beams were supported, and also the out-shore ends of all except four interior beams of bridge 54 and six of bridge 56. This blocking under the out-shore ends of the beams was put in somewhat as an experiment to see if the material overlying the rock would hold such load as came upon it, and it was found that it would.

When, in 1912, it became necessary to provide for still heavier locomotives than had up to this time been permitted, it was necessary to further strengthen these bridges, and it was at first decided to replace the superstructures. As this involved a very large expenditure, and as a future change in the line is contemplated which will eliminate these bridges altogether, it was decided to furnish the necessary strength by providing additional bearing to complete the system of temporary floor beam supports and by strengthening the steel floor system. The method of construction for these additional supports for the floor beams is quite unusual and will be described in the following:

DRILLING OPERATIONS

Two core drills were used in drilling the holes for the reception of wrought iron pipe columns. One, a steam-driven drill, was used on bridge 56 only; the other, driven by a three-cylinder gasolene engine, was used on both bridges. Fig. 2 shows the latter drill at work. The drilling operations were carried on from below the bridge in order not to interfere with the operation of trains. At bridge 54, where the water was not so deep as at bridge 56, a crib of ordinary construction was built and sunk to support the platform for the drilling outfit, whereas, at bridge 56, it was cheaper to build a pile platform.

As soon as the temporary drill platform was completed, the drilling operations started. It was necessary to drill through from 15 to 30 ft. of sand, gravel, broken stone and boulders (shown in Fig. 3, which is a section through the center line of the out-shore truss of bridge 56) before solid rock could be reached. The supports shown in this figure are only for the out-shore ends of floor beams, the in-shore ends being supported as hereinbefore mentioned, and as shown under the four exterior beams. This necessitated driving a casing which would subsequently form part of a

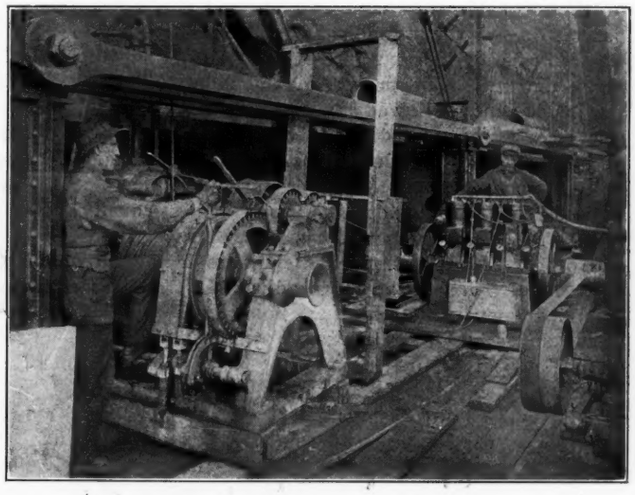


Fig. 2—A Core Drill Driving a Casing

steel and concrete column. This casing, of extra heavy 12 in. wrought iron pipe in lengths of 5 to 10 ft., was driven by a solid weight of 1,500 lb., operated by the hoist on the drill. Large boulders encountered in driving the casing were shattered by placing a small charge of dynamite in the hole left after the removal of the core made by drilling several feet into the boulder. Before any blasts were set off, however,

the drill was removed entirely and the casing raised about 4 ft.

To provide an even bearing for the casing in the sloping rock, a shelf was made by blasting. The blasting in this case was identically the same as that adopted in shattering the boulders. After the casing was firmly set, the drilling of solid rock was commenced. The depth of holes in the rock varied from 8 to 12 ft., according to the slope. Had the rock been comparatively level, a depth of hole of from 3 to 4 ft. would have been sufficient for the foundation of the 8 in. pipe columns. When the drilling of each hole had been completed, the stone core was broken off at the bottom and removed; this left a hole 10¾ in. in diameter. A core taken from one of the holes is shown in the lower left hand corner of Fig. 2.

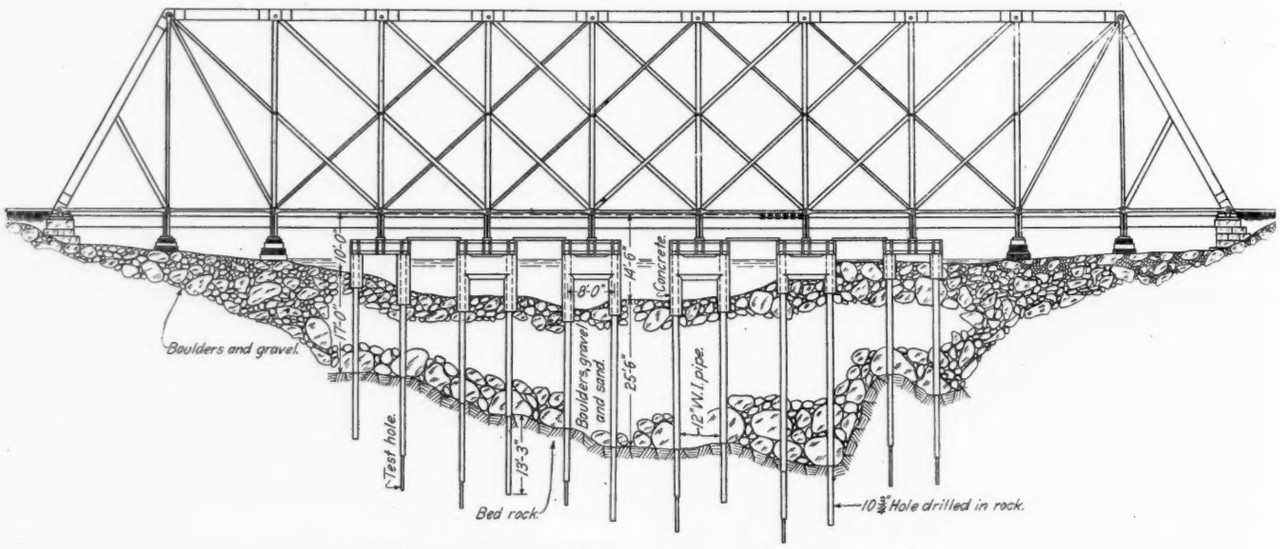


Fig. 3—Strengthening a Bridge by Means of Supporting Cylinders

PLACING PIPES AND COLUMNS

The filling of the pipe casings was deferred until the drilling of all the holes had been completed. During this period of time considerable sand had entered the holes through fissures in the rock, and had become tightly packed. This was removed by loosening it with a steam jet and then cleaning it out with a flopper-valve sand pump. The placing of the inside pipes followed the cleaning of the hole. The inside pipes were centered in the casings by means of two sets of bolts in each length of pipe. Each set contained three bolts, extending from the inside surface of the pipe to the desired distance outside, the bolts being equally spaced around the circumference of the pipe, each set 1 ft. from the end of each length of pipe. Being provided with nuts the bolts could therefore be made adjustable. The inside pipes extended from the bottom of the holes up through the casings to the underside of the girders shown in Figs. 3 and 4; they were made up of 10 ft. lengths of 8 in. wrought iron pipe, ½ in. thick, coupled together with bearing joints, and with the top lengths and casings sawed off at the required elevations. These inside pipes have four rows of 2 in. x 4 in. slot holes, one row in each quadrant, space alternately 1 ft. apart lengthwise of the pipe. These holes permitted the grout of 1:2 proportions, with which the pipes were filled after being placed to run through and fill up the space between the pipe and casing, and the pipe and rock below the casing.

When the work as described above had been completed, the columns were encased in concrete above the river bottom as a matter of preservation. Further, where there was considerable depth of water, and, therefore, a considerable length of unsupported column which might be a source of weakness due to the action of ice in winter, longitudinal expansion and contraction of the bridge span, etc., concrete struts were placed between the columns and were made an integral part of the concrete encasing said columns. These struts are shown in Fig. 3. Where there was little or no water the columns were encased in concrete of octagonal form, as shown in Fig. 4, with the concrete struts omitted. A built-up galvanized sheet metal form, of the shape shown by the finished concrete in Fig. 3, with one side open to permit of its removal after the concrete had hardened, was set up where a strut was required, and the reinforcement then placed. "U" shaped 1¼ in. rods, extending around the 12 in. casings and coupled together at the center of the strut with turnbuckles, were placed near the top and bottom of the concrete. Stirrups, "U" shaped, of ⅞ in. diameter rods, were hung from the upper set of bars. To the stirrups were wired 1 in. diameter longitudinal reinforcing rods equally spaced between the upper and lower set of "U" bars. A mixture of 1:2:4 concrete was then placed. After the concrete had sufficiently hardened, the metal form was removed and used for another strut. To expedite the work, however, several of these forms were made and used at both bridges. The forms for the octagonal concrete column casings were made of wood.

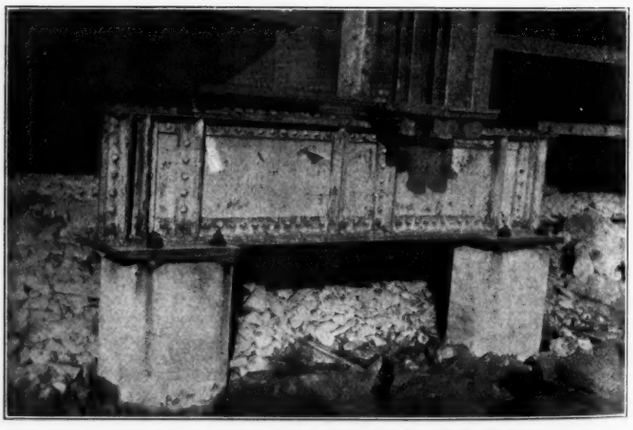


Fig. 4—Octagonal Concrete Casings Supporting Girders and Floor Beam

PLACING THE GIRDERS

Cast steel caps 19 in. x 19 in. x 1½ in., with ¾ in. circular rims of 12¾ in. inside diameter, and 3 in. in depth, were

placed over the pipes after the completion of the concrete work. The underside of the cap and the inside of the rim were faced to provide a snug fit over the outside pipes and a good bearing on the tops of both inside and outside pipes, respectively. The built-up girders shown in Figs. 3 and 4 were then placed and bolted to the caps, which were provided with four 1 5/16 in. holes. A space of 1 3/8 in. remained between the underside of the lower flange of the floor beam and the top of the bearing plate on the upper flange of the girders after the girders were placed. This space was filled with a pair of wedges which were driven to secure a light bearing under the floor beams. Holes were then drilled in the wedges and girder and slot holes were made in the lower flange of the floor beams, and the three bolted together. The slot holes were designed to permit the free longitudinal expansion and contraction of the bridge span. The girders were tied together with 4 ft. x 4 in. x ⅜ in. angle struts placed on the upper flange, as shown in Fig. 3. Stiffeners were placed in the web of the floor beams directly over the center of the girders.

The method of strengthening was developed by A. W. Carpenter, formerly engineer of structures, and now valuation engineer. The field work was under the supervision of R. E. Dougherty, district engineer; J. W. Pfau, engineer of construction, and G. W. Kittredge, chief engineer.

ABSTRACT OF ENGINEERING ARTICLES

The following articles of special interest to engineers and maintenance of way men, and to which readers of this section may wish to refer, have appeared in the *Railway Age Gazette* since July 17, 1914:

New Low Grade Line from Tacoma, Wash., to Tenino.—The Northern Pacific is completing a double track line with low grades, 44 miles long, to replace a single track line between the same points and provide a continuous double track between Seattle and Portland. The construction included some heavy grading work along the east shore of Puget Sound, a large part of the embankment being protected by a sea wall of an unusual type. One tunnel, 4,391 ft. long, was driven near Tacoma. Details of the interesting features of this new line were published in the issue of July 24, page 159.

Passenger Terminal Improvements at Buffalo.—As a result of extended negotiations with the city's Terminal Station Commission, the Delaware, Lackawanna & Western has agreed on plans for a new passenger terminal to be located on the Buffalo river and work has been begun on the structure. The conditions making this improvement necessary and details of the proposed station are included in an illustrated description in the issue of July 24, page 166.

The Federal Valuation of the San Pedro, Los Angeles & Salt Lake.—On account of the general interest in the important task which the government has undertaken of making a physical valuation of the railways of the country, the detailed description of the organization which has been formed on the San Pedro line and the methods which are being followed in collecting the field data for this valuation, written by E. G. Tilton, formerly chief engineer of this line, is very timely. This was published in the issue of July 31, page 195.

New Great Northern Line from Oroville to Wenatchee.—The 134 miles of new line built by the Great Northern between Wenatchee, Wash., and Oroville, serving a large undeveloped area and providing a low grade outlet to Spokane for a considerable amount of traffic, involved the relocation of 13 miles of highway most of which was the Washington state road No. 10, the driving of three tunnels and the bridging of five rivers. This interesting construction work was illustrated and described in the issue of July 31, page 202.

New Passenger Terminal at Dallas, Tex.—Contracts have recently been let for a union station in Dallas, Tex., which will replace the five stations previously occupied by the nine roads entering the city. The details of this improvement were contained in an illustrated article in the issue of August 7, page 252.

Railroad Development in the Philippine Islands.—The problem of transportation was a difficult one in the occupation of the Philippine Islands by the United States military forces following the Spanish war, and the development of adequate railway facilities in the islands was one of the first things to which the new civil government, established after the war, turned its attention. A discussion of this development touching on the engineering features, details of construction, organization and traffic problems, contributed by C. H. Farnham, formerly chief engineer, Cebu division of the Philippine Railway Company, was published in the issue of August 14, page 279.

Building a Modern Terminal Road at Youngstown, Ohio.—The Lake Erie & Eastern, a subsidiary company of the Pittsburgh & Lake Erie and the Lake Shore & Michigan Southern, is building a line 8¾ miles long through the city of Youngstown, O., to reach a number of important industries and possibly to form, ultimately, a link in a direct freight connection controlled by the New York Central Lines between Youngstown and Cleveland. The construction of this road involved exceptionally heavy bridge work in which advanced practice in a number of details has been adopted. An illustrated description of this construction work was published in the issue of August 14, page 286.

An editorial commenting on the elimination of shop painting on the structural steel for the heavy bridges on the Lake Erie & Eastern was published in the issue of August 14, page 275.

NEW FRISCO BOOK OF RULES FOR THE MAINTENANCE OF WAY DEPARTMENT

The St. Louis & San Francisco has just gotten out a book of rules and instructions for employees engaged in the maintenance of way department, which differs from those commonly used in its greater completeness and detail. In addition to the general rules for all employees and those for the foremen, etc., detailed instructions are given regarding the size of gangs and the methods to be adopted when laying rail, placing ballast, etc., the purpose of the book being not only to promulgate rules for the proper prosecution of the work, but to standardize this work as far as possible over the system. Detailed instructions are given regarding the places where tie plates, anti-creepers, etc., are to be used and the methods of installation. Seven pages are devoted to the laying of rails. Equally detailed and complete instructions are given for the guidance of foremen of water service, bridge foremen, signal maintainers, etc. These instructions cover 106 pages. In the rear of the book there are drawings of standard ballast, sections, mile posts and other markers with tabular data showing the amount of material required for repair and renewal work, etc.

A NEW ASPHALT ROOFING

The patterns and colorings of slate and tile roofing are approached in effect by a new prepared asphalt roofing manufactured by the Patent Vulcanite Roofing Company, Chicago. The new material, which is known as "Vulcan-Tile," is new only in the decorative features, the same fire-resisting and weather-proof qualities possessed by the granite coated asphalt roofing, which has been sold by this company for several years, being secured by the use of the same base, the same substance and the same coating. The patterns which give the roofing the appearance of slate or tile when laid are a part of the rock surface which insures that they will last as long as the roof. Vulcan-Tile is coated with crushed granite in two colors, red and green. The Vulcanite asphalt, which is used as the saturating and coating compound, is claimed to make the roofing material withstand softening and evaporation in hot weather, freezing and cracking in winter, crumbling in dry weather, and to insure its being fire-resisting, waterproof and wind-tight. The material is put up in rolls weighing 80 lb., and containing 108 sq. ft. Rust-proof nails and binding cement are packed in each roll. The roofing, the colors and the patterns are guaranteed for ten years.

ELECTRIFICATION OF RAILWAYS IN ITALY.—Electric operation has recently been begun by the Turin & Savona Railway of Italy for passenger traffic only, on the section of the line across the Apennines, between the latter town and Ceva, a distance of 29 miles. This section, which is the heaviest part of the line, includes the Belbo tunnel, about three miles in length with maximum grades of 2.5 per cent. The maximum speed is 31 miles per hour. Savona ranks after Genoa and Venice, as one of the important coal ports of Italy; it is also an important manufacturing town, with large steel works.

THE NEELY SPRING LOCK

A new spring nut and bolt lock is being tested by the Pennsylvania Railroad, the Pennsylvania Lines, and the Pittsburgh & Lake Erie, all of which report satisfactory service. The Neely spring lock is applied without special tools and can be used with either square or hexagonal nuts on standard track bolts. The locking feature is secured by the ribs which are shown engaging the edges of the nut in the accompanying illustration. The locks are made from a rolled bar of high grade spring steel which, it is claimed, will insure a permanent spring and take care of the natural elongation of the bolt in service. Each lock is heat treated and tempered in oil.

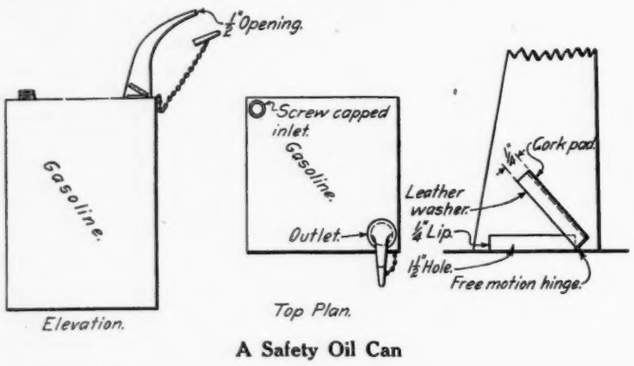
The Pennsylvania Railroad has had a number of these locks in service on the lower rail of a curve at West Philadelphia since March, 1913. The traffic over this track is very heavy and consid-

Neely Spring Lock

erable amounts of water, gas and grease are present. On an inspection made in December, 1913, all of the locks were in good condition, with one exception, the looseness of that particular lock being attributed by the officers making the inspection to peculiar conditions surrounding that point. The test on the Pennsylvania Lines has been made at Upper Sandusky, Ohio, where the locks have been in service on about one mile of track for over a year. A report of this test states that the lock is giving very satisfactory service. The Pittsburgh & Lake Erie is testing 500 of the locks at McKeesport, Pa., the latest report on this test stating that their service up to date has been satisfactory but that they have not been in use for a long enough time to draw final conclusions. This lock is made by the Neely Nut and Bolt Co., Pittsburgh, Pa.

A SAFETY OIL CAN

The oil can shown in the accompanying drawing has been devised by S. Joseph DeGraeff, division storekeeper of the Coast division of the Southern Pacific, in response to a demand for a can which would increase safety in handling gasolene and other highly inflammable oils. This can is made



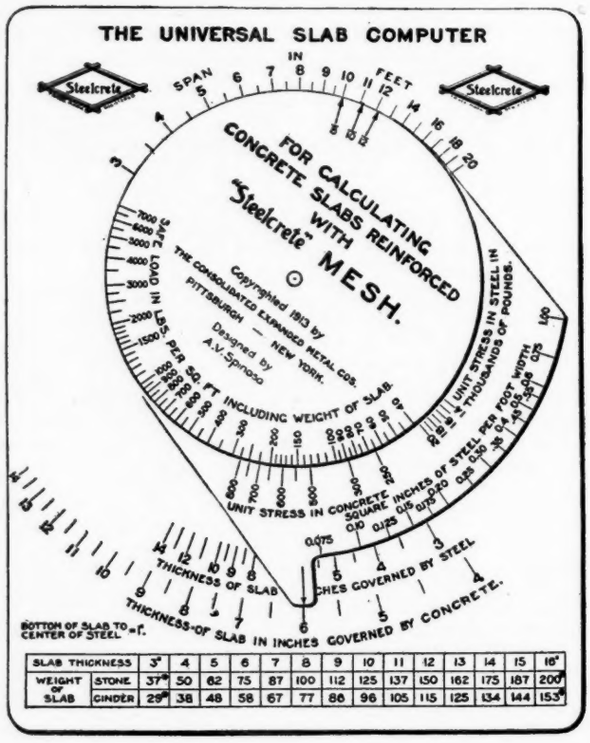
A Safety Oil Can

from an old 5 gal. oil can, and is painted target red for gasolene, and corresponding colors for other materials. The word "gasolene" is stenciled on all sides and on the top. The contents of the original packages are transferred to these safety oil cans immediately upon receipt, thereby doing away with the necessity of keeping an open can around section and tool houses.

THE UNIVERSAL SLAB COMPUTER

A new circular slide rule has recently been perfected by the Consolidated Expanded Metal Company, New York, for the design of reinforced concrete slabs using any unit stresses in the concrete and steel, and any common bending moment, span, load and slab thickness. The rule was designed by the use of the "straight line" formula, which was slightly simplified to reduce the number of operations on the rule. Any difference in results attained by the rule and with the exact formula is said to be negligible and is on the side of safety. The unit stresses in the steel shown on the face of the rule range from 14,000 lb. to 20,000 lb. per sq. in. The unit stresses in the concrete shown on the face of the rule range from 250 to 800 lb. per sq. in. The arrows marked ⅛, 1/10, and 1/12 represent the bending moment factor which is usually covered by the specifications. In general, the value of ⅛ should be used for a simple slab, 1/12 for a continuous slab, and 1/10 for a slab simple at one end and continuous at the other.

The safe loads in lb. per sq. ft. given on the face of the rule


THE UNIVERSAL SLAB COMPUTER
Steelcrete
Steelcrete
FOR CALCULATING CONCRETE SLABS REINFORCED WITH "Steelcrete" MESH.
Copyrighted 1913 by THE CONSOLIDATED EXPANDED METAL COS. PITTSBURGH — NEW YORK.
Designed by A.V. Spinoso
LOAD IN LBS. PER SQ. FT. INCLUDING WEIGHT OF SLAB.
UNIT STRESS IN CONCRETE
SQUARE INCHES OF STEEL PER FOOT WIDTH
UNIT STRESS IN STEEL IN THOUSANDS OF POUNDS.
THICKNESS OF SLAB
INCHES GOVERNED BY STEEL
THICKNESS OF SLAB IN INCHES GOVERNED BY CONCRETE.
BOTTOM OF SLAB TO CENTER OF STEEL = r.

SLAB THICKNESS		3"	4	5	6	7	8	9	10	11	12	13	14	15	16"
WEIGHT OF SLAB	STONE	37*	50	62	75	87	100	112	125	137	150	162	175	187	200*
	CINDER	29*	38	48	58	67	77	86	96	105	115	125	134	144	153*

are the total live and dead loads. In using the rule it is therefore necessary to assume the thickness of the slab and take the weight of a slab of that thickness from the table at the bottom of the rule. The distance from the bottom of the slab to the center of steel is an arbitrary figure which has been taken as one inch in designing the rule. If it is desired to provide for a distance other than one inch, the result can be corrected by deducting one inch from the thickness of the slab secured on the rule and adding the value desired. In all slab problems the double solution is necessary, the first to secure the minimum thickness of slab required by the limiting unit stress in the concrete, and the second to secure the area of steel required with the given thickness of slab, load, span and bending moment.

The slide rule is made of celluloid, and is approximately 4¾ in. by 6¼ in. The lettering is covered with a finishing coat to prevent its rubbing off. Full directions for using the rule are given on the back.

English Cloth for Belgian Railway Employees.—The Belgian State Railways recently ordered 180,000 yards of English textiles for employees' uniforms.

General News Department

In Montreal and many other places the Canadian Pacific is putting on duty numerous armed guards to watch buildings, yards, cars, bridges and and other property.

The grain elevator of the Intercolonial Railway at St. John, N. B., was destroyed by fire, August 12, together with 350,000 bushels of wheat. Estimated loss $1,000,000.

On Sunday, August 16, according to a press despatch, the sum of $25,000 was taken in by the government in the shape of tolls for the passage of vessels through the Panama Canal.

The Railroad Smoke Inspectors' Association of Chicago held its annual excursion and outing on August 18, at South Haven, Mich. A number of informal addresses dealing with the smoke situation in Chicago were made.

Plans for the rehabilitation of the Mexico Northwestern have had to be suspended on account of the European war. The road is owned by a syndicate of Englishmen, who also have other large property holdings in Mexico. During the long period of revolution long stretches of track and many of the bridges were destroyed. Parts of the line are now in operation.

On a tour of 3,500 miles traveled by Mayor James H. Preston and party, of Baltimore, recently made in the interest of the coming National Star Spangled Banner Centennial, the efficiency of American railroad service was shown by the fact that the entire journey was made on schedule time. The party traveled in a special car on regular trains; visited 22 cities in 16 states of the central west and south, and used 12 different railroads.

Telegraph operators employed by the Southern Pacific system are taking a vote on authorizing a strike to enforce their demands for increases in pay and changes in working conditions on the lines east of El Paso, to correspond with those provided in a contract for the lines west of El Paso which went into effect on September 1 last year. The men ask an increase of 12½ per cent in rates, increased pay for overtime, and $5 a month extra for operators who are station agents and also perform certain other duties.

The safety bureau of the El Paso & Southwestern has issued a circular showing the behavior of 3,607 automobiles and their drivers observed during the period of one week while crossing the tracks of the road in El Paso. It was found that 2,907, or 80 per cent of the drivers of these automobiles, did not look in either direction; 620, or 17 per cent looked only in one direction, and only 80, or 2 per cent, took the precaution to look both ways before crossing the tracks; while 296 of the number who looked in neither direction crossed at a speed greater than 20 miles an hour. And six of this number saw the flagman and crossed the tracks disregarding his signal.

The monorail street car line which was built in the northern part of New York City a few years ago, appears, after many vicissitudes, at last to be dead. A new line of ordinary street cars, with storage battery motive power, was put in service August 18. The line is from the City Island station of the New York, New Haven & Hartford Railroad to Belden's Point, about 3 miles. The opening of the line followed the condemnation of the monorail as unsafe a few months ago. The Union Railroad bought the monorail franchise from the Interborough Rapid Transit Company. On the first car run over the road this week were Edward E. McCall, chairman of the Public Service Commission; District Attorney Francis Martin; the Acting Borough President of the Bronx, and other public officers.

The Southern Pacific Company has recently completed a new commissary building at Los Angeles, Cal., at a cost of $100,000. In its construction and arrangement every possible means has been taken to provide a sanitary and up to date commissary plant. It is dust proof and fly proof. The provisions are weighed, iced, sorted and issued without once having been touched by human hands. All liquids are delivered in sealed glass containers and cream is moved in gallon tins that are thrown away after once being used. In order to eliminate contamination from refuse there has been provided a special concrete-lined room where the garbage, pending incineration, is immediately placed under refrigeration. The building is surrounded by covered platforms on all sides which are provided with water, compressed air and steam used to keep the buildings in a sanitary condition. The building is also provided with a humidor, measuring 10 ft. by 4 ft., having a capacity of 40,000 cigars. The supplies issued from this commissary aggregate between $40,000 and $50,000 in value per month, and this only for the southern territory, which extends from Los Angeles north to Fresno and Santa Barbara and east as far as New Orleans. In combination with the big kitchen is a cooking school, where the dining car cooks are instructed in the preparation and serving of stock material. The exterior of the building is thoroughly in keeping with the interior in sanitation and cleanliness, the moral effect of cleanliness on the crews not having been overlooked.

Westinghouse Air Brake Contest

The competition in which the sum of $2,000 in prizes was offered by the Westinghouse Air Brake Company for the six best stories submitted, under certain conditions, dealing with the experience and practical knowledge of railroad employees regarding any striking performance of the air brake manufactured by that company closed August 1, 1914. The following committee of judges is now engaged in examining the stories: W. E. Symons, consulting mechanical engineer, Chicago; Willard Smith, editor, Railway Review, Chicago, and R. V. Wright, managing editor, *Railway Age Gazette*, New York. Very considerable interest was displayed in the contest and a large number of stories were submitted, so that several weeks will elapse before the judges will be able to announce the winners of the prizes.

"Safety First" Rules for Passengers*

Don't stand in the doorway. Some fool may rush through the waiting room and hurl you on the tracks. Besides, you are in the way of other passengers.

Don't rush through the doorway. You may collide with someone coming in and hurl him out on the tracks.

Don't stand too near the tracks. There is always a possibility of your being jumped on by some irresponsible leaping from a moving train, or being caught by something projecting from a car.

Don't attempt to cross tracks to eastbound platform until you are sure that there is nothing coming this way on the west-bound tracks. Hesitate a moment and look.

Don't step on any metal if you can avoid it. There is a live rail under the wooden guard on both sides of the center platform, contact with which means death. Use extreme care not to stub your toe under the guard rail.

Don't attempt to board a moving train. There is no business or engagement so important as to risk the chance of going through the rest of your life on crutches.

Don't stand near the door of a baggage car. There may be baggage to unload and a trunk coming down on your toes is not a pleasant sensation.

Don't cross in front of a standing train unless you are sure that you can get clear in case it should start.

Don't fail to reach the station in sufficient time to catch your train. More men have dropped dead from overexertion trying to catch trains than have died under the wheels.

*From a typewritten bulletin posted by Station Agent S. J. Murray, at Hewlett, Long Island.

The Western Wages Arbitration

The locomotive engineers of the Western roads have chosen as their member on the board which is to arbitrate the wages controversy with their employers, F. A. Burgess, assistant grand

chief engineer of the brotherhood; and the firemen have chosen Timothy Shea, assistant president of their brotherhood. The railroads, as announced last week, have chosen Vice-president Park of the Illinois Central, and Vice-president Byram of the Chicago, Burlington & Quincy. The names of the other two members will not be announced for some time. The Act of Congress of July 15, 1913, the Newlands law, providing for the settlement of controversies concerning wages and conditions of service between railroads and their employees, provides that after the selection of the arbitrators by the parties the four thus selected are to be convened upon order of the United States Board of Mediation and Conciliation, and that when thus assembled they shall be allowed fifteen days within which to select the two impartial arbitrators; and the Board of Mediation has adopted the policy of requiring them to exhaust the fifteen days in that effort. But if the four fail to agree upon the impartial arbitrators, the law provides that they are to be named by the government board; but there is no limitation of time as to their selection and appointment. In the present case both parties to the controversy have asked that they be given until the first week in October to prepare their cases, and inasmuch as the hearings must begin within ten days of the appointment of the two impartial arbitrators, the government board will not announce the two names until about September 20, even if the men should be selected before that date.

The Canadian Pacific Telegraph Department

The Canadian Pacific Railway now operates 13,800 miles of telegraph line, 102,600 miles of wire, and 1,400 telegraph offices; and over three-fourths of its wires are used in commercial service. The length of the wires now in use is three times that recorded in the year 1900, and the number of offices is 40 per cent greater than in that year. The number of messages sent in 1913 was about 5,000,000, or three and a half times as many as in 1900. The company operates more than twenty long duplex circuits, including one from New York to Winnipeg. Between Montreal and Bamfield, B. C., which is the terminal of the cable to Australia, the Wheatstone apparatus is used. The Morkrum printing telegraph has been used on this company's lines for two years and four duplex circuits are in operation now.

Apparatus has been ordered for a duplex Morkrum circuit between Montreal and Winnipeg and for another between Winnipeg and Moose Jaw. These two new long circuits will be worked by tape transmission, the speed of which is about 60 per cent greater than can be attained by hand transmission. Telephones are now used by train despatchers on over 6,000 miles of Canadian Pacific lines. Telephone equipments are carried on trains.

Illinois Candidates for Legislature Asked Not to Pledge Support for Anti-Railroad Bills

W. T. Tyler, vice-chairman of a committee of the Illinois railroads, has addressed a circular letter to all candidates for the state legislature, asking them not to pledge their support for anti-railroad bills before their introduction in the assembly. The letter follows:

"As a candidate for the general assembly, you no doubt will be importuned to pledge yourself, if elected, to support certain measures proposed to be introduced at the next session, including bills directed against or ostensibly for the regulation of the railroads. This letter is addressed to you by the railroads of the state of Illinois to ask that you do not bind yourself to support or vote for any bill of this nature until it is regularly introduced in the assembly and you have had an opportunity to inform yourself fully as to its full purport and effect and its need.

"The last session of the general assembly created a Public Utilities Commission with full power to regulate the railroads of Illinois in every particular as to operation, rates of charge, service to the public, etc. It also provided this commission with ample machinery and experts to enable it to correctly determine the necessity for and the best manner of applying regulative measures. Hence, there does not now exist in Illinois a need for direct action by the legislature upon such matters.

"The effect of most legislation affecting railroads, and especially that introduced by the labor organizations, is greatly to increase the cost of operation of the railroads. You will, of course, recognize that this increase in cost of operation must be paid by the consumer; that is, by the citizens of the state, so it is only proper that the Public Utilities Commission charged with the responsibility of securing for the people of Illinois the best service at the minimum of cost, should, after a proper investigation, determine as to the necessity for these items of increase; and, as stated above, this commission is prepared to inform itself fully upon the various matters from every angle and will give full consideration to the interests of the public, the railroads and the employees in its deliberations.

"We believe that it will be repugnant to you to bind yourself to vote for or support a bill upon the full effect of which you have not had an opportunity to inform yourself and which when finally introduced may contain features not fully and fairly represented to you and of immense importance to the public as well as the railroads, and that this in itself will deter you from giving any such pledge; but in the past some candidates have, through misunderstanding or otherwise, inadvertently allowed themselves to be so pledged, to their later embarrassment. Hence the railroads, asking merely for the same consideration accorded to any other citizen of the state of Illinois, ask that you preserve an open mind upon all proposed legislation affecting or regulating them until, if you are elected, the proposed law is placed before you in the regular and proper manner and you are enabled to hear both sides of the issue involved. You will then be free to act as seems to you to be fair and just.

"Won't you do us the courtesy to acknowledge receipt, and if consistent advise if you will grant our request?"

R. S. A. Convention Subjects

Secretary C. C. Rosenberg of the Railway Signal Association has issued the following abstract of the program for the annual meeting of the association, which is to be held at Bluff Point, N. Y., September 22.

Committee I. Signaling Practice.—Reports on aspect for instructions to trains to take siding at a non-interlocked switch; requisites for switch indicators and automatic train control. Also additional data on track circuits and treated ties.

Committee II. Mechanical Interlocking.—Mechanical derail layouts and switches (8 drawings).

Committee III. Power Interlocking.—Specifications for the installation of a vitrified clay conduit system, including drawings; specifications for incandescent electric lamps; the use of thirty volts or less for the control of interlocking apparatus, conclusions 1 to 8, inclusive. Revised drawing No. 1,309.

Committee IV. Automatic Block.—Specifications for R. S. A. cell caustic soda primary battery and specifications for direct current vibrating highway crossing alarm. Three drawings showing circuits for automatic block systems.

Committee V. Manual Block.—Rules governing signal supervisors and rules governing maintenance of block signals.

Committee VI. Standard Designs, Etc.—Presenting twenty (20) drawings of various apparatus shown in detail and assembly. Also six (6) exhibits as information. Report on signal symbols and nomenclature.

Committee VII. Subjects and Definitions.—Definitions for twelve words.

Committee VIII. Electric Railways and A. C. Signaling.—Specifications for transformer oil; specifications for petrolatum for use in impedance bonds; specifications for a. c. electric generators, and specifications for overhead crossings of electric light and power lines. Also data of systems using a. c. railway signaling submitted as information.

Committee IX. Wires and Cables.—Changes in existing specifications for galvanized steel signal wire. Specifications for galvanized messenger wire, also recommended sags for messenger wire of various sizes and strength; specifications for rubber insulated tape and specifications for friction tape.

Committee X. Storage Battery and Charging Equipment.—Specifications for electrolyte for lead type storage battery; specifications for nickel, iron alkaline storage battery and specifications for concrete storage battery box. Also eight drawings.

Special Committee. Method of Recording Signal Performance.—Five forms for recording interruptions to traffic by signals.

Special Committee. Signaling Requirements of Electric Railways.—Report showing signal aspects and rules for same as

adopted by the American Electric Railway Association; submitted as information.

Special Committee. Lightning Protection.—Specifications and requisites for air gap lightning arresters; specifications and requisites for vacuum gap lightning arresters and specifications and requisites for choke coils for use with lightning arresters.

American Foundrymen's Association and American Institute of Metals

The American Foundrymen's Association and the American Institute of Metals will hold their annual conventions at the LaSalle hotel, Chicago, September 7-11. In connection with these conventions the Foundry & Machine Exhibition Company will conduct its annual exhibit from September 5 to 11, inclusive, at the International Amphitheater located at the Stock Yards in Chicago. This exhibit will include many articles of interest to railroad men. A review of the list of the 164 exhibitors discloses the fact that 50 per cent of them handle railway supplies. About forty of these are prominent builders of modern machine tools that are in every-day use in railway shops. Others represent shop accessories, such as pneumatic tools, grinding machines and abrasives, cranes, hoists and other shop fixtures that are no less important. The oxy-acetylene and electric welding companies will be represented with working demonstrations of their systems as will also the Goldschmidt Thermit Company. Railway men who can take the time to attend this exhibit will find it very well spent.

Master Blacksmiths' Convention

The twenty-second annual convention of the International Railroad Master Blacksmiths' Association was held at the Hotel Wisconsin, Milwaukee, Wis., August 18-20. The meeting was presided over by H. E. Gamble, of the Pennsylvania Railroad, and the convention was welcomed to the city by A. E. Manchester, superintendent of motive power; J. F. De Voy, assistant superintendent of motive power, and J. J. Hennessey, master car builder, of the Chicago, Milwaukee & St. Paul, and by W. W. McLellan. Following is a list of the exhibitors:

Acme Machinery Company, Cleveland, Ohio.—Samples of forgings and model of forging machine. Represented by C. E. Smith, C. W. Durschlag and F. R. Andrews.

Ajax Manufacturing Company, Cleveland, Ohio.—Samples of forgings. Represented by A. L. Guilford, J. A. Murray and Henry Gaul.

Chambersburg Engineering Company, Chambersburg, Pa.—Photographs of power hammers, presses, etc. Represented by H. S. Nixon.

Goldschmidt Thermit Company, New York.—Sample welds. Represented by H. S. Mann and W. A. Aldrich.

Houghon & Co., E. F., Philadelphia, Pa.—Carbonizing compounds, quenching and tempering oils. Represented by F. B. Niessen.

National Machinery Company, Tiffin, Ohio.—Forging, grinding and bolt threading machines.

Convention of United Yardmasters' Association

The first annual convention of the United Yardmasters' Association was held at the New St. Louis Hotel, Duluth, Minn., August 3, 4 and 5. Among the subjects presented for discussion were: Closer Relationship Between Yard Men and Their Superior Officers; Promotion of a Higher Standard of Efficiency in all Departments of Yards and Terminals; Courtesy to Patrons and Fellow Employees; Elimination of the Practice, so Prevalent Among Shippers, of Tipping Switchmen for Services; Concentrated Efforts Against Intemperance, and Promotion of Greater Care in the Handling of Equipment and Shipments, and a More Rigid Inspection of Conditions in Which Loads Arrive and Depart. Through the courtesy of the railroads, special trains carried the members over the terminals of the Northern Pacific and over the Duluth, Missabe & Northern to Virginia, Minn.

This association is composed of yardmasters and assistant yardmasters throughout the country and aims to promote general efficiency in the operation of terminals. The officers for the past year, all of whom were re-elected, were: John Murphy, president; J. J. Meehan, vice-president; D. J. Flynn, treasurer, and W. H. Streeter, secretary. The next convention will be held at Seattle, Wash.

Old Time Telegraphers and Historical Association

Secretary F. J. Scherrer of this association announces that in view of the distressing conditions growing out of the European war, the meeting scheduled to be held in Kansas City, September 15, will not be held. The officers of the Society of the United States Military Telegraph Corps fully concur in the postponement of the reunion. Notice of the time and place for the 1915 reunion will be sent to the members in due course.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 4-7, 1915, Hotel Sherman, Chicago.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Demurrage Commissioner, Boston, Mass. Annual convention in April.

AMERICAN ASSOCIATION OF DINING CAR SUPERINTENDENTS.—H. C. Boardman, D. L. & W., Hoboken, N. J. Next convention, October 22-24, Washington, D. C.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, Illinois Central, East St. Louis, Ill. Annual meeting, May 21-24, 1915, Richmond, Va.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York. Annual meeting, September 15-16, Boston, Mass.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, Room 101, Union Station, St. Louis, Mo. Next convention, August 20-21, New York.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—E. B. Burritt, 29 W. 39th St., New York. Annual convention, October 12-16, Atlantic City, N. J.

AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOCIATION.—H. G. McConnaughy, 165 Broadway, New York. Meetings with American Electric Railway Association.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Semi-annual meeting, November 18, Chicago.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Next convention, October 20-22, 1914, Los Angeles, Cal.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 16-18, 1915, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June, 1915.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—A. R. Davis, Central of Georgia, Macon, Ga. Annual meeting, July, 1915.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. W. Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except, June, July and August, 220 W. 57th St., New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 11 Broadway, New York. Regular meetings, 2d Thursday in month, at 2 P. M., 11 Broadway, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Annual meeting, December 1-4, 1914, New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Mt. Royal Sta., Baltimore, Md. Next convention, January 19-21, 1915, Chicago.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—E. R. Woodson, 1300 Pennsylvania Ave., N. W., Washington, D. C. Annual convention, April 28, 1915, Atlanta, Ga.

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS.—George W. Lyndon, 1214 McCormick Bldg., Chicago. Annual meeting, second Tuesday in October, New York.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—C. W. Egan, B. & O., Baltimore, Md. Annual meeting, 3rd week in May, 1915, Galveston, Tex.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Annual convention, October 26-30, 1914, Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Soo Line, 112 West Adams St., Chicago. Annual meeting, June 22-25, Rochester, N. Y.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Next meeting, December 8-9, 1914, Richmond, Va.

BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—L. D. Mitchell, Detroit Graphite Co., Chicago, Ill. Meetings with American Railway Bridge and Building Association.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawler Ave., Chicago. Regular meetings, 2d Monday in month, except July and August, Lytton Bldg., Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—Edw. J. Dugan, P. O. Box 654, St. Paul, Minn.; Regular meetings, 2d Monday, except June, July, August and September, Old State Capitol Bldg., St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—Edw. R. Dasher, Box 75, Harrisburg, Pa. Regular meetings, 1st Friday after 10th of each month, except July and August, 31 So. Front St., Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer R. Hiles, Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, R. F. & P., Richmond, Va. Annual meeting, June 16, 1915, Chicago.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, 11, Rue de Louvain, Brussels, Belgium. Next convention, June 23 to July 6, 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, C. & E. I., 922 McCormick Bldg., Chicago. Annual meeting, May 17-20, 1915, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 829 W. Broadway, Winona, Minn. Next convention, July 14-17, 1915, Sherman House, Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio. Next convention, August 18-20, Hotel Wisconsin, Milwaukee, Wis.

MAINTENANCE OF WAY & MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—T. I. Goodwin, C. R. I. & P., Eldon, Mo. Next convention, November 17-19, 1914, Detroit, Mich.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York. Annual convention, May, 1915.

MASTER CAR & LOCOMOTIVE PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Next convention, September 8-11, Nashville, Tenn.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Annual meeting, June, 1915.

NATIONAL RAILWAY APPLIANCES ASSOCIATION.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Next convention, March 15-19, 1915, Chicago.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, except June, July, August and September, Boston.

NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meetings, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings monthly.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria, Ill. Regular meetings, 2d Thursday in month, Jefferson Hotel, Peoria.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Friday in month, Kansas City.

RAILROAD MASTER TINNERS, COPPERSMITHS AND PIPEFITTERS' ASSOCIATION.—U. G. Thompson, C. & E. I., Danville, Ill. Annual meeting, May, 1915.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 30 Church St., New York. Annual meeting, December 10, 1914, Waldorf-Astoria Hotel, New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

RAILWAY FIRE PROTECTION ASSOCIATION.—C. B. Edwards, Fire Ins. Agt., Mobile & Ohio, Mobile, Ala. Annual meeting, October 6, 1914, Washington, D. C.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Times Bldg., Bethlehem, Pa. Annual meeting, September 22-24, 1914, Bluff Point, N. Y.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, L. S. & M. S., Box C, Collinwood, Ohio. Annual meeting, May, 1915.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with M. C. B. and M. M. Associations.

RAILWAY TELEGRAPH & TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.

RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill. Next convention, September 8-10, 1914, Chicago.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

SALT LAKE CITY TRANSPORTATION CLUB.—R. E. Rowland, Hotel Utah Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmunds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—Carl Nyquist, C. R. I. & P., La Salle St. Sta., Chicago. Annual meeting, September 15-17, Hotel Aspinwall, Lenox, Mass.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Atlanta, Ga.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Candler Bldg., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. S. Marks, Agent, Interstate Despatch, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo Iron Works, Hillsburn, N. Y. Meetings with Roadmasters' and Maintenance of Way Association.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month, except June, July and August, Waldorf-Astoria, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie R. R., Pittsburgh, Pa. Meetings bimonthly, Pittsburgh. Annual meeting, 2d Monday in June.

TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Bldg., St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago. Annual meeting, June 15, 1915, Minneapolis, Minn.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, L. S. & M. S., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y. Next meeting, September 15-18, Hotel Sherman, Chicago.

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Consolidated Music Hall, Salt Lake City.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Karpen Bldg., Chicago.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF JUNE, 1914

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses					Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total. inc. misc.	Maintenance Way and structures.	Maintenance Of equipment.	Traffic.	Trans-portation.	General.	Total.					
Ann Arbor	292	$108,952	$42,848	$165,594	$24,077	$9,347	$6,508	$66,927	$9,106	$115,965	$49,629	$34	$13,770	$35,893	—$3,271
Bangor & Aroostook	631	240,590	52,664	307,966	37,564	42,132	2,471	78,489	10,855	171,491	136,475	—559	7,438	128,478	—15,550
Chesapeake & Ohio Lines	2,367	2,421,879	528,321	3,161,159	443,398	536,437	58,907	1,023,939	133,710	2,196,391	964,768	1,570	64,469	901,869	—48,493
Chicago, Rock Island & Pacific	7,852	3,438,595	1,538,202	5,931,553	782,218	844,004	149,745	2,174,880	144,031	4,094,878	1,836,675	—9,464	250,938	1,576,273	—255,313
Detroit, Toledo & Ironton	441	134,213	12,276	157,630	116,739	44,338	3,941	90,804	9,469	265,291	—107,661	.....	13,038	—120,699	—25,271
Georgia, Southern & Florida	395	116,063	60,157	202,488	21,911	32,556	8,350	77,865	10,472	151,154	51,334	.....	11,192	40,142	3,755
International & Great Northern	1,160	429,733	173,863	654,704	138,643	Cr. 15,412	25,097	401,598	33,936	583,862	70,842	—1,260	25,000	44,582	—33,855
Lehigh Valley	1,444	3,072,000	420,843	3,621,628	368,424	511,943	85,542	1,103,816	88,224	2,157,949	1,463,679	—39,931	126,895	1,296,853	360,158
Nashville, Chattanooga & St. Louis	1,231	648,745	249,512	972,653	113,984	148,713	44,949	351,528	28,666	687,840	284,813	—362	31,577	252,874	128,014
New Orleans, Mobile & Chicago	403	127,897	28,542	166,899	24,633	30,807	3,790	51,757	8,295	119,282	47,617	34	6,310	41,341	17,183
Oahu Ry. & Land Co	102	58,944	22,540	88,441	4,301	7,141	664	21,724	7,468	41,298	47,143	.....	6,966	40,177	3,307
Spokane, Portland & Seattle	556	222,701	158,755	415,928	162,649	43,603	9,614	92,374	13,965	322,205	93,723	—2,902	53,400	37,421	124,164
Union Pacific	3,616	2,871,225	932,862	4,049,072	470,773	635,608	124,651	1,015,239	132,336	2,378,607	1,670,465	—7,829	189,274	1,473,362	—345,235
Western Maryland	661	593,975	87,761	711,148	189,445	198,762	23,526	293,533	33,432	738,698	—27,550	—1,754	27,105	—56,409	—13,872

TWELVE MONTHS OF FISCAL YEAR ENDING JUNE 30, 1914

Ann Arbor	292	$1,407,141	$535,468	$2,096,169	$246,509	$264,302	$63,118	$793,496	$87,575	$1,455,000	$641,169	—$97	$164,050	$477,022	$11,550
Bangor & Aroostook	631	2,938,888	663,167	3,795,412	513,970	504,078	30,576	1,232,128	121,208	2,401,960	1,393,452	—1,318	112,606	1,279,528	358,112
Chesapeake & Ohio Lines	2,367	28,866,516	6,098,059	36,690,021	4,138,092	7,692,748	669,283	12,167,906	985,508	25,653,937	11,036,084	28,486	1,330,935	9,733,635	429,701
Chicago, Rock Island & Pacific	7,853	42,348,182	18,186,009	65,388,334	8,479,599	9,452,480	1,808,655	27,279,927	1,872,478	48,893,139	16,495,195	—165,055	3,200,577	13,129,563	—1,481,716
Detroit, Toledo & Ironton	441	1,269,388	136,489	1,542,734	720,851	574,430	32,455	975,178	73,919	2,376,833	—834,099	.....	75,738	—909,837	—667,423
Georgia, Southern & Florida	395	1,454,363	830,691	2,596,549	318,223	508,529	101,824	1,059,710	123,676	2,111,962	484,587	—1,349	136,220	347,018	—47,556
International & Great Northern	1,160	7,024,295	2,243,936	9,941,374	1,633,202	1,100,369	321,038	4,556,773	400,198	8,021,580	1,919,794	—18,854	339,841	1,561,099	—810,973
Lehigh Valley	1,444	33,519,367	4,795,147	39,783,564	4,575,062	7,011,946	1,002,872	14,071,183	948,099	27,609,162	12,174,402	—280,244	1,549,895	10,344,263	—1,863,874
Nashville, Chattanooga & St. Louis	1,231	8,781,321	3,071,445	12,778,333	1,938,499	2,391,419	513,441	4,853,052	383,028	10,073,439	2,698,894	—10,058	326,557	2,362,279	—206,799
New Orleans, Mobile & Chicago	403	1,710,284	368,125	2,204,370	325,121	278,201	46,478	705,123	96,234	1,451,157	753,213	—908	85,726	666,579	8,989
Oahu Ry. & Land Co	102	813,220	302,770	1,192,885	114,693	96,689	7,895	268,182	60,969	548,428	644,457	.....	87,324	557,133	—3,396
Spokane, Portland & Seattle	556	2,870,639	1,635,894	4,901,740	880,721	455,070	96,038	1,217,341	159,472	2,808,642	2,093,098	—5,843	640,800	1,446,455	—559,362
Union Pacific	3,616	35,826,351	10,616,227	51,075,516	5,614,030	7,309,133	1,266,978	13,803,468	1,505,023	29,498,632	21,576,884	—125,696	2,263,265	19,187,923	—1,906,065
Western Maryland	661	6,877,763	1,021,816	8,267,736	1,588,475	1,887,555	280,045	3,825,336	267,219	7,848,630	419,106	—1,754	263,205	154,147	—1,221,726

Traffic News

The Oklahoma two-cent fare case will be tried before Federal Judge Youmans, in Oklahoma City, October 21.

The Missouri, Kansas & Texas is running a "good roads special" train over its lines in Texas to arouse interest in the construction of better highways.

The State Railroad Commission of Alabama has ordered sweeping reductions of freight rates on the Central of Georgia, the Western of Alabama, and the Louisville & Nashville.

The Western Classification Committee has announced that hearings will be held at its office in Chicago to consider applications for changes in ratings, rules, etc., on August 24, on nuts and cheese, and on August 25, on junk and fire-fighting apparatus.

The Central Freight Association roads began a meeting in Chicago on Tuesday of this week to prepare tariffs of advanced freight rates as allowed under the commission's recent decision. It is hoped to have the tariffs ready so that they can be made effective October 1.

Export freight is moving from Atlantic ports in small volume, and some increase is expected during the next week. Inquiries for coal are being received from Mediterranean ports. Press despatches from Galveston report that in the four days, August 15-18, large quantities of wheat were shipped from that port—about 1,000,000 bushels.

W. R. Grace & Co. have announced rates on lumber from the Atlantic to the Pacific coast through the Panama canal by the Atlantic & Pacific Steamship Line. The rates are $13 per 1,000 board feet for 30-foot lengths and less, $14 for lengths from 30 to 40 feet, and $17 for lengths from 40 to 50 feet. The $13 rate represents a reduction of $4 from the rate via the Straits of Magellan.

The Senate at Washington on Monday of this week agreed to the House Bill to admit foreign ships to American registry; and this law, facilitating commerce between this country and Europe, was expected to be signed by the President on Wednesday. American vessels will still have the monopoly of coastwise traffic, the new registry privileges applying only for the benefit of overseas trade.

The Southern Railway is to make a month's tour with its "dairy instruction car" over its lines in Virginia, beginning at Charlottesville, August 24. The car will visit 53 towns. The car is fitted out like a complete farm dairy and carries charts and exhibits giving complete information about dairying and its problems. Milk samples will be tested and advice given on all questions of interest to dairymen.

It is reported in Buffalo that while the railroads delivering freight at ports on the Atlantic seaboard in the United States are unable to accept shipments of freight for Europe on account of the unsettled condition of ocean transportation because of the war in Europe, the Canadian Pacific has announced, at its western and southern agencies, that it is prepared to accept all freight for all ports in Great Britain and Ireland.

Representatives of the Texas Railways held a meeting recently in Galveston to discuss plans for obtaining general advances in Texas rates, either by application to the railroad commission or by proceedings in the courts to restrain the operation of rate schedules already fixed by the commission. Commissioner Mayfield, of the commission, has announced that he favors a public hearing to consider a petition from the roads, but he says that the organization of the commission is inadequate for an investigation of such magnitude.

For the benefit of the fruit growers in West Virginia, Virginia and Maryland, the Baltimore & Ohio has issued a booklet containing a list of the orchardmen and commission merchants in the localities mentioned. The lists embody valuable information to both the producers and receivers of fruit. They include a list of brokers and wholesale dealers in the markets of New York, Philadelphia, Baltimore, Washington, Boston, Providence, Springfield, Shelburne Falls and Worcester. In 1912 apples shipped over the Baltimore & Ohio amounted to 1,861 carloads, and there were 221 carloads of peaches.

Charles L. Chandler, South American agent for the Southern Railway, at Chattanooga, tells southern manufacturers and merchants that they should lose no time in taking advantage of the opportunity which the war in Europe has given them for extending their trade with South American countries, particularly with Argentina and Uruguay, on account of the direct steamship service to these countries through the port of Mobile. These countries have been buying largely from Great Britain, Germany and France, but must now find a new source of supply. The recent establishment of an American bank at Buenos Ayres and Rio Janeiro will prove of great advantage. Mr. Chandler is prepared to furnish information of every character in regard to South American markets.

The roads of the Transcontinental Passenger Association have announced the authorization of low fare colonist excursions to the West and Northwest Pacific Coast this fall. Tickets from Chicago one way second class will be sold at $38, and from Missouri river points at $30, with corresponding reductions from St. Louis and other points. These tickets will be on sale daily from September 24 to October 8. This move is contrary to the expressed intention of the roads which voted a year ago not to make the colonist reductions this year. The initiative was taken by one of the larger lines, which insisted that its territory needed the assistance of low rates in securing settlers. A majority of the roads immediately agreed to the plan, but it was decided to limit the sale to two weeks.

A "Corn Show" is the latest novelty adopted by a railroad company to promote business. The Oregon-Washington Railroad & Navigation Company has issued in pamphlet form a premium list for such a show, to be held at Walla Walla, November 25, 26, 27 and 28. Competition is open to everybody in the territory tributary to the company's lines in Oregon, Washington and Idaho. Not much corn (maize) has been raised in those states in the past, and the traffic department of the road is taking measures to encourage its growing. The acreage planted in Oregon and Washington this year is more than double that of last year, and the quality is much better. There will be a large number of prizes, ranging from $50 for the best general display down to $2.50, which is the amount of the smaller prizes for a single acre, and for the best twelve ears of corn. A number of manufacturers have offered prizes of agricultural implements.

The railway members of the Western Trunk Line Committee, the Southwestern Tariff Committee and the Trans-Missouri Freight Bureau have prepared tariffs, to become effective on September 15, canceling the allowance for actual weight of dunnage not in excess of 500 lb., used by shippers and furnished at their expense to protect freight in carloads shipped in box, stock or refrigerator cars. This action is in accordance with a recent decision of the Interstate Commerce Commission allowing the cancellation of the dunnage allowance in Southwestern territory. The dunnage allowance was instituted by the Minneapolis, St. Paul & Sault Ste. Marie about two years ago and was adopted by the roads in Western classification territory, but not in the transcontinental tariffs. The commission held that in view of the fact that the substitution of dunnage for the more expensive boxes and crates and other packing material is of advantage to the shipper and reduces the gross weight upon which freight charges must be paid, it is not inconsistent that the carriers should receive revenue for the total weight hauled.

In the Supreme Court of the District of Columbia, on Monday of this week, the American Steel & Wire Company was denied its application for an order directing the Interstate Commerce Commission to make an affirmative order in the industrial railway case. The commission having held that the Newburgh & South Shore Railway, the traffic of which is the subject of this suit, is only a plant facility, the trunk line or long distance railroads on April 1, discontinued dividing through freight rates with it. The Newburgh & South Shore operates 59 miles of freight lines in and around Cleveland, Ohio. During the arguments R. F. Dennison, attorney for the Cleveland City Street Railroad, which also is interested in the suit, said that this is one of the cases in which the commission, by threats of indictments uttered against the trunk lines, is able to accomplish by indirection what the courts will not allow it to accomplish by

direct methods—classification of railroads by ownership. "The fundamental question here involved," declared C. W. Needham, attorney for the commission, "is as to whether the Steel Trust and other big corporations are to be allowed to collect from $25,000,000 to $40,000,000 a year in rebates, under pretense that the tracks which they have built to their plants are common carrier railroads, performing a service of transportation for the public."

The art of packing fruit is the latest subject to be taken up by a traveling instruction car. The "Agricultural Department" of the New York Central road in conjunction with the College of Agriculture of Cornell University is going to start a car on this mission August 21, manned by professors from the college, representatives from the New York State Department of Agriculture, and from the fruit growers' associations, and by Mr. Welsh, agriculturist of the New York Central. The car will be fitted up with exhibits of all kinds relating to the packing and marketing of fruits, and of uniform grading of apples as required under the provisions of the new apple packing law of New York. Demonstrations will be made, at each stop, of the packing of "orchard run" fruit, which will be furnished by local growers. The new law is the outgrowth of efforts of the fruit growing societies of the state, to secure legislation which will result in more uniform packing and a better reputation for quality of New York apples. Lantern slides will be used by the lecturers to show the increasing receipts of different varieties of apples in the New York City market, the preferences of different markets for different varieties, prices of fruit and the effect of cancellations of car orders on the available car supply. The car is going to stop at Marlborough, Ulster Park, Saugerties, Coxsackie, Ravena, Schodack Landing, Stuyvesant, Hudson, Germantown, Poughkeepsie, Spencerport, Brockport, Albion, Medina, Lockport, Fulton, Oswego, Hannibal, Red Creek, Sodus, Williamson, Webster, Hilton, Morton, Lyndonville, Barker, Burt and Ransomville. A period of three hours is allowed at each town.

The Pacific Mail Steamship Company

R. P. Schwerin, vice-president and general manager of the Pacific Mail Steamship Company, in giving testimony this week before the Interstate Commerce Commission, said that the existence of the company depends on the willingness of the commission to grant its application for permission to continue in the coastwise trade to Mexican ports. The Pacific Mail is controlled by the Southern Pacific, which reaches by rail some of the Mexican cities with which the steamship company trades.

The specific point involved in the hearing was Mazatlan. Mr. Schwerin said that he had no fear that the Panama Canal act could be construed to include his company's business with Mexican and Central American points other than those reached by the Southern Pacific's rail lines. But, without the Mazatlan business his company could not engage profitably in the South Coast trade; and the company's Oriental business would become unprofitable if the coasting steamships were discontinued.

The steamship company has paid no dividends since 1898, and he said that its continuance "has been largely sentimental."

The company has seven steamships running to China, Japan and the Philippines and nine between San Francisco and Panama.

Control of Plague at New Orleans

The plague situation in New Orleans is entirely under the control of the Public Health Service of the United States. There are 10 commissioned officers now in the city with 300 employees under their command. All freight passing through and out of New Orleans receives thorough inspection from the officers of the Public Health Service. Every vessel entering and clearing from the port is fumigated with carbon monoxide gas, which effectually destroys all vermin or other animal life without in the slightest degree injuring the most delicate cargo. . . .

Railroad freight leaving the city receives a thorough inspection. As rat fleas are the only carriers of plague, all freight cars are inspected when empty by officers of the Public Health Service, who see that they are clean, free of rats, and rat-proof.

Cars which are not proof against rats are required to be repaired before being loaded. During one week 800 cars were rat-proofed and 10 condemned. Approximately, 2,000 cars a week are being inspected. Not only are the cars inspected, but the freight intended for them is also examined, and packages likely to harbor rats are required to be repacked. All cars are loaded under the direct supervision of inspectors of the Public Health Service. Each car so loaded is closed by the inspector, and sealed with a lead seal bearing the Service device. Cars loaded under this inspection are labeled with the inspection number, car number, destination, and the legend, "Inspected and passed as rat free, conditional upon unbroken seal."

Freight passing through the city is handled with the utmost despatch, and there is no need for the diversion of freight intended for any destination other than Costa Rica (which maintains a quarantine).

Several of the railways entering New Orleans have already taken up the question of rat-proofing their storage and freight terminals, in accordance with the plans which are being drawn up by the Public Health Service.—*From a Government Report.*

General Reduction of Freight Rates in North Carolina

The special commission appointed in North Carolina last October to consider a proposed reduction of freight rates in that state has made a report recommending a reduction which on the average amounts to about 18 per cent. The conclusion of the commission is in effect a compromise between the view that present rates are reasonable, and a reduction of about 33 per cent which was made by a law, the "Justice Act," passed by the legislature last year, and subsequently suspended because of the complaints made by the carriers. It is expected that the governor will prescribe the new rates to go into effect October 12; although the railroad companies still have the privilege of protesting. There are few or no reductions on rates for ten miles and less. The provision, heretofore in effect, that the Southern Railway might charge 25 per cent above normal rates on shipments originating in the mountain division, is done away with. Railroads operating less than seventy-five miles of lines in North Carolina are not affected by the present report. The special commission recommends that rates for these shorter roads be fixed by the North Carolina Corporation Commission.

National Industrial Traffic League

The summer meeting of the National Industrial Traffic League was held at the Copley-Plaza hotel, Boston, Mass., on August 12-15. The committee on storage rules reported the success of the negotiations conducted with the American Railway Association and the Interstate Commerce Commission regarding a uniform code of storage rules, which has now been tentatively endorsed by the commission. The committee on weighing also reported the results of similar negotiations which have led to the adoption of a code of weighing rules, with an exception on the part of the league as to the provision for tolerance. The committee also called attention to a new code of rules proposed by the Chicago Coal Dealers' Association which have been submitted to the American Railway Association. The subject of federal supervision over track scales was discussed and the league expressed its tentative disapproval of such supervision.

The proposed elimination of dunnage allowances by the western roads was discussed, but no action was taken, although many of the shippers are opposed to the cancellation on the ground that it will in effect increase freight charges. A report was presented by a special committee on graduated storage charges and demurrage charges and the subject was referred to a joint committee on legislation and storage charges. The committee was opposed to the theory of storage charges graduated to penalize the practice of storing beyond a reasonable time, on the ground that it is the duty of the carriers to store freight. Consideration was also given to a proposition of the American Railway Association for an increased demurrage charge for refrigerator cars when used for perishable freight shipments, the proposed charge being $2 per car per day for the first 48 hours and $3 a day thereafter. The committee on demurrage and storage charges will confer on this with the commission merchants, many of whom are in favor of the plan.

A proposed amendment to the Carmack amendment of the commerce act, which is a part of the administration securities bill, was discussed and opposed on the ground that its prohibition of the limitation of liability by the carriers would nullify present classification provisions relating to the uniform bill of lading, without which rates would be advanced 10 per cent. The legislative committee and the bill of lading committee were instructed to endeavor to postpone any action by Congress on the Carmack amendment at this time.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The commission on August 19 decided against the railroad commissions of Arkansas, Missouri and Oklahoma in their petition asking for a reduction from the rate of 3 cents a mile on interstate passenger fares through those states. The complainants sought to have the two cent intrastate rate made the basis of interstate charges. The commission held that the defendant railroads did not voluntarily establish and do not voluntarily maintain the intrastate passenger fare of two cents a mile, and that interstate fares at the three-cent rate were not unreasonable. In appealing to the Interstate Commerce Commission the state commissions sought to show that a reduction of the interstate rate would stimulate travel, filing exhibits tending to support the contention that the two-cent intrastate rates had produced increased net revenues for the carriers. The commission thought other conclusions might be drawn from other tables and sustained the three-cent rate. The commission says, however, that the ruling does not mean that "there may not be force in the theory that a reduction of rate tends to increase travel."

Rates on Wheat to Sioux City, Iowa

Sioux City Terminal Elevator Company et al v. Chicago, Milwaukee & St. Paul et al. Opinion by Commissioner Clements:

The commission in this case prescribes local rates on grain from producing stations in South Dakota, Nebraska, Iowa and Minnesota to Sioux City, Iowa. (31 I. C. C., 482.)

Rates on Wrapping Paper to Muskogee

E. C. Adleta, doing business as Adleta Paper Company v. Chicago & North Western et al. Opinion by Commissioner McChord:

The commission finds that rates of 51 and 52 cents per 100 lb., respectively, on wrapping paper to Muskogee from Nekoosa, a representative Wisconsin point and Munising, a representative Michigan point, are unreasonable; and it is ordered that these rates should not exceed 34 cents and 35 cents per 100 lb., respectively. Reparation awarded. (31 I. C. C., 347.)

Rates on Canned Goods to Oklahoma City

Carroll, Brough & Robinson et al v. Atchison, Topeka & Santa Fe et al. Opinion by Commissioner Daniels:

The commission finds that the present rate of 45 cents per 100 lb. in carload lots on canned goods and other similar articles listed under this heading in the western classification No. 51 from Galveston, Houston and other points in south Texas to Oklahoma City and other intermediate points in Oklahoma are unreasonable and discriminatory against Oklahoma City as compared with the rate on the same commodity from Galveston to points in Texas, Arkansas, Kansas and also as compared with rates from other gulf ports and other sources of supply of canned goods to points competing with Oklahoma City. (31 I. C. C., 466.)

Uniform Demurrage Code

Michigan Manufacturers' Association et al v. Pere Marquette et al. Opinion by the commission:

Complainant alleges as unreasonable various provisions of the uniform or national code of demurrage rules, particularly in relation to their application to certain kinds of traffic in Michigan. A request is made that the free time allowed be changed from two days to three days for unloading cars containing coal, coke, charcoal and lumber (except cargo and lightered lumber); to three days for loading or unloading cars of sash, doors, blinds, inside finishing materials, box materials, and mixed cars of dressed lumber; to three days for loading cars with furniture and to five days for loading, weighing and billing coal at mines in the state. The commission does not feel that these Michigan industries differ so materially from similar industries in other sections as to entitle them to special demurrage rules. In those exceptional cases wherein the exigencies and peculiar nature of the shipper's business are such as to make it more economical to hold cars beyond the free time allowed it is only proper that demurrage for the additional delay should be charged. It would seem that these instances are, with most of the Michigan shippers, sufficiently rare as to permit of such additional charge being offset by credits if the shipper is operating under the average agreement, or to be otherwise taken care of, if not operating under that agreement, by resort to the bunching or weather-interference rules. It adheres to previously expressed views that the existence of merely unique or exceptional transportation conditions in certain localities furnishes no ground for exceptions unless it be made to appear clearly that discrimination would otherwise result against such localities. In this case there would be no such discrimination. (31 I. C. C., 329.)

Rates from Bowling Green, Kentucky

Bowling Green Business Men's Protective Association of Bowling Green, Ky., v. Louisville & Nashville et al. Opinion by Commissioner Meyer:

The commission finds that the construction of through rates from Chicago and Milwaukee territories to Nashville, Tenn., by the addition of proportional rates from points of origin to the Ohio river to the local rates from the river to Nashville contrasted with the construction of rates to Bowling Green by the addition of the local rates to and from the river crossings does not result in discrimination against Bowling Green. A similar manner of constructing through rates from Indianapolis territory to Nashville and Bowling Green is found to discriminate against the latter point and it is ordered that the through charges from Indianapolis territory via Louisville to Bowling Green should not exceed the rates concurrently effective on like traffic to Nashville. (31 I. C. C., 1.)

Through Rates Between Rail and Water Lines

Pacific Navigation Company v. Southern Pacific et al. Opinion by Commissioner Meyer:

Complainant, a common carrier operating the steamers Harvard and Yale (formerly in service between New York and Boston) between San Francisco, San Pedro and San Diego, Cal., asks that the defendant rail carriers be required to establish through routes and joint passenger fares with its steamers to the same extent as at present maintained with the Pacific Coast Steamship Company and the San Francisco and Portland Steamship Company. The commission finds that complainant's request should be granted. In so far as the Western Pacific and the San Pedro, Los Angeles & Salt Lake and their connections are concerned the commission holds that it unquestionably has jurisdiction to require the establishment of through routes with complainant's steamers because the rail carriers have no rail lines between San Francisco and Los Angeles, and the question of short hauling themselves can not be raised. In view of the fact that the Southern Pacific and the Atchison, Topeka & Santa Fe which have rails of their own between San Francisco and Los Angeles have granted through routes in connection with the Pacific Coast Steamship Company and the San Francisco & Portland Steamship Company, it is held that they also may be required to join with complainant in establishing through routes and joint fares. The commission also finds that by maintaining through routes and joint fares with the two steamship companies and refusing to establish them with complainant, defendants are violating section three of the act to regulate commerce. It is also declared that if rail carriers are permitted to choose the particular boat lines with which they will establish through routes and joint rates, they will be able to dictate who shall operate on the water and who shall not, for a boat line which is accorded a monopoly of the through rail-and-water traffic will soon be able to drive its competitor out of business. The spirit of the act to regulate commerce is to maintain the freedom of our ports and to allow boat lines to engage in traffic upon equal terms. To permit the rail carriers serving a port to favor one boat line or another would destroy the freedom of competition between boat lines, which the act is intended to preserve and would practically close ports to all but the favored vessels. (31 I. C. C., 472.)

STATE COMMISSIONS

The Minnesota Railroad & Warehouse Commission has issued an order directing that hereafter the Chicago, St. Paul, Minneapolis & Omaha and the Chicago & North Western, for the purpose of applying rate schedules, shall be considered as separate and independent roads.

The Kansas Public Utilities Commission has issued an order refusing permission to the railroads to apply western freight classification No. 52 on Kansas traffic without approval of the commission. The commission, however, has given its approval, with the exception of 12 classes of items, on which it proposes to have an investigation.

The Texas Railroad Commission has issued an order abolishing the Galveston-Houston differential rates on cotton and cotton linters and establishing in their place commodity rates based on a distance tariff, to become effective on September 10. The commission states that every effort was made to avoid changes in the amounts of the rates.

The Iowa Railroad Commission has filed a petition with the Interstate Commerce Commission asking for a rehearing of the interior Iowa rate case, which was decided recently by the Interstate Commerce Commission. The petition claims that the rates fixed in this case unjustly discriminate against the interior Iowa cities in favor of places along the Mississippi river.

The Public Utilities Commission of Ohio has issued a circular addressed to the railroads and shippers of Ohio entitled, "Keep the Cars Moving," appealing both to the railroads and shippers to make every effort to obtain the maximum efficiency in the use of freight cars to avoid a possible car shortage. The bulletin contains a list of suggestions to the railroads and also suggestions to the shippers of methods for securing maximum efficiency.

The Nebraska State Railway Commission has issued an order, to take effect September 6, providing for a reduction of about 19 per cent in all class freight rates in Nebraska, covering about one-third of the total freight traffic of the state. The reduction is based on a distance tariff with certain modifications. The commission says in its decision that a compilation prepared by its rate expert shows that the reduction on the intrastate traffic will aggregate $611,000 annually. There will also be a substantial reduction on interstate rates, the amount of which is impossible to estimate, but which the commission says will probably amount to $750,000 annually. The commission says that the jobbing points of the state have been placed on an equalized basis, the purpose being to preserve present commercial conditions so far as it is possible to do so without continuing present inequalities or abuses. The commission found the Nebraska merchants opposed to a distance traffic, and is unanimous in its opinion that to establish a rigid maximum and minimum distance tariff would be disastrous to the jobbing and manufacturing interests of the state and that it would reduce competition without benefit to the ultimate consumer.

Colorado Public Utilities Commission

The Colorado State Railroad Commission went out of existence on August 12, and was merged with the new Colorado Public Utilities Commission, which was created by an act of the legislature last year. The new commission has jurisdiction over railroads, express companies, telephone, telegraph, water, lighting, power and street railway companies, and has power to suspend rates in advance of their taking effect, its decisions to be subject to review by the state supreme court. The bill creating the commission was rendered operative recently by District Judge Allen, of the city and county of Denver, through the issuance of an injunction restraining the secretary of state from referring the act to a referendum at the fall election. Two referendums attacking sections of the act will be submitted to the voters under the referendum act, but will not affect it as a whole. The court's decision in effect authorizes the merging of the old commission with the Public Utilities Commission. A. B. Anderson, S. S. Kendall and George T. Bradley, the three railroad commissioners, are to serve in a similar capacity on the new commission. Under the old laws the commission could only act on complaint and could not initiate proceedings on its own motion. The new commission is given power for the immediate enforcement of its decisions until reversed by the supreme court.

PERSONNEL OF COMMISSIONS

Henry L. Oestreich, senior assistant division engineer of the New York Public Service Commission, First district, died August 13, at Atlantic City, N. J., where he had been for eight weeks suffering from septic poisoning. Mr. Oestreich was born in 1869, and was graduated from New York University in 1888. During the construction of the New York subway, 1900-1904, he was in charge as assistant engineer of the section of construction on Lafayette street and Fourth avenue, between Great Jones street and Nineteenth street. Later he had charge of important construction for the Centre street loop.

COURT NEWS

At Fairmount, W. Va., the Baltimore & Ohio has been served with an injunction, under the new prohibition law of West Virginia, restraining the carrier from delivering certain whiskey consigned to A. Bellomo, for 57 other persons; and the company is further restrained from accepting intoxicating liquors for transportation to persons in that state without first ascertaining that the liquors are for the personal use of the consignees.

The New York State Public Service Commission, Second district, has been enjoined temporarily by Judge Ray of the United States District Court, from enforcing its order requiring the Delaware, Lackawanna & Western to restore two trains between Syracuse and Oswego. Judge Ray does not question the jurisdiction of the Public Service Commission to regulate intrastate service on an interstate carrier, but holds that an interstate carrier so regulated may appeal to the federal courts rather than to the courts of the state. But he holds that the present service is sufficient, and the case will have to be tried on its merits in his court. The time for final disposition of the case has not been set.

Decisions of Courts Affecting Labor

The federal bureau of labor statistics has issued its annual bulletin No. 152, containing a selected list of decisions by the federal courts and the higher courts of the various states on labor laws and kindred subjects.

About 170 court decisions are considered. Most notable are the decisions which relate to the new remedy of workmen's compensation for industrial accidents. The constitutionality of the laws of New Jersey and Washington on the subject was sustained by the supreme courts of those states. A provision of the law of Wisconsin which makes it the duty of the employer to provide medical treatment for the injured workmen is the subject of a decision which points out some ways in which abuses may be avoided. This bulletin probably presents the largest number of strictly American cases on this subject that can be found as yet in a single volume.

Many decisions are reported construing the federal statute relating to the liability of interstate railroads for injuries to their employees, the chief point involved being the scope of this law. Among the employees held to be within its provisions are a brakeman getting ice to cool hot boxes on his train, a truckman loading a detached car with interstate freight, a pumpman at a water station, a repair man working on an engine tender on a siding, a member of a switching crew placing an oil car to furnish oil for fuel for an interstate locomotive, a yard clerk taking the numbers of the cars in an interstate train, and a track repairer injured by an intrastate train while at work on a bridge.

There is a report of the contempt case against the leaders of the American Federation of Labor, growing out of the injunction in the Buck Stove and Range Company case. The Supreme Court of the United States in May, 1914, reversed this judgment because of the lapse of time since the acts complained of were committed, but without expressing any opinion as to the merits of the case. A law of Illinois forbidding the use of emery wheels, etc., for polishing processes in basements, without reference to the actual conditions as to ventilation, and one of Louisiana limiting the hours of labor of certain classes of stationary engineers were held to attempt unjustifiable discriminations.

Railway Officers

Executive, Financial, Legal and Accounting

Duval West, of San Antonio, Tex., has been appointed receiver of the San Antonio, Uvalde & Gulf.

E. T. Lamb, receiver and general manager of the Atlanta, Birmingham & Atlantic Railroad, with headquarters at Atlanta, Ga., has been elected president of its successor the Atlanta, Birmingham & Atlantic Railway. Brooks Morgan, of Atlanta, has been elected vice-president, and F. K. Mays, treasurer and purchasing agent, has been appointed secretary and treasurer.

Operating

P. H. Mattimoe has been appointed superintendent of weighing, inspection and handling freight of the Wabash, with headquarters at St. Louis, Mo.

J. L. Terry, general superintendent and auditor of the Denver, Laramie & Northwestern, has been appointed general manager, with headquarters at Denver, Colo.

James B. King has been appointed trainmaster of the Taylor subdivision of the International & Great Northern and J. A Caldwell has been appointed trainmaster of the Gulf division.

David Crombie, who has been appointed superintendent of transportation of the Canadian Northern, Eastern lines, with headquarters at Toronto, Ont., as has been announced in these columns, was born in 1864, at Hamilton, Ont., and was educated in the public schools. He began railway work in 1882 with the Grand Trunk, and previous to 1890 was operator, agent, and train despatcher on that road. He then served as train despatcher and car service agent on the Flint & Pere Marquette at Saginaw, Mich., until 1900, when he became superintendent of transportation at Detroit of its successor the Pere Marquette. From 1903, to 1907, he was out of railway service, and in the latter year went to the Grand Trunk as master of transportation. Three years later he was appointed assistant to general transportation manager, and in 1912, was made assistant to vice-president, remaining in that position until January, 1913, when he was made general superintendent of transportation of the same road. In August of the same year he returned to the service of the Pere Marquette as inspector of transportation at Detroit, and in May, 1914, was appointed inspector of transportation of the Canadian Northern, which position he held at the time of his recent appointment as superintendent of transportation of the same road as above noted.

D. Crombie

The jurisdiction of C. W. Coe, superintendent of the Toledo division of the Wheeling & Lake Erie, at Brewster, Ohio, has been extended over the Cleveland division. F. B. Barber, who has been superintendent of the Cleveland division, has been appointed assistant superintendent of the Cleveland and Toledo divisions with headquarters at Brewster. D. J. Morris, assistant superintendent, has been appointed assistant superintendent of transportation at Brewster.

H. H. Maher has been appointed trainmaster of the Lake Superior division, including the Duluth-Superior terminals, of the Northern Pacific, with headquarters at Duluth, Minn. R. T. Taylor has been appointed trainmaster of the First, Second, Fifth, Tenth and Eleventh subdivisions, Lake Superior division, with office at Duluth, in place of L. F. Newton, transferred to Mandan, N. D., as trainmaster. A. M. Deverell has been appointed chief despatcher and division operator of the Minnesota division in place of W. G. Howland, transferred.

Arthur John Hills, whose appointment as general superintendent of the Ontario Grand division of the Canadian Northern, Eastern lines, with headquarters at Toronto, Ont., has already been announced in these columns, was born on February 15, 1879, at Toronto. He was graduated from Ridley College at St. Catherines in 1893; from Upper Canada College, at Toronto in 1896, and from the University of Toronto in 1899. In April of the latter year, he entered the service of the Canadian Northern, as stores and material agent of the construction department in Manitoba. From June, 1901, to December, 1903, he was a clerk in the general superintendent's office at Winnipeg, Man., and then went to the third vice-president's office of the same road at Toronto. He was appointed superintendent of the Canadian Northern Ontario in January, 1908, with headquarters at Toronto, which position he held at the time of his recent appointment as general superintendent of the Canadian Northern as above noted.

Traffic

B. D. Shropshire has been appointed commercial agent of the Rock Island Lines at Ft. Worth, Tex., to succeed I. G. Thompson, resigned.

The headquarters of D. L. Rupert, division freight agent of the Detroit, Toledo & Ironton, have been removed from Ironton, Ohio, to Lima.

W. A. Dolan having resigned as general New England agent of the Chicago Great Western at Boston, Mass., that office is abolished, and C. L. Smith is appointed general agent freight department at that place.

Engineering and Rolling Stock

Paul A. G. Tilmot has been appointed assistant roadmaster of the Northern Pacific at Tacoma, Wash.

F. D. Nauman has been appointed division engineer on the Chicago division of the Baltimore & Ohio, with headquarters at Garrett, Ind., succeeding John Tordella, promoted.

H. F. Staley, master mechanic of the Carolina, Clinchfield & Ohio at Erwin, Tenn., having resigned, G. F. Shull has been appointed acting master mechanic, and W. S. Moseley has been appointed mechanical engineer, both will have their headquarters at Erwin.

Purchasing

The office of purchasing agent of the Southern Pacific at Portland, Ore., held by A. E. Hutchinson, has been abolished.

OBITUARY

Major Joseph G. Pangborn, formerly assistant general passenger agent of the Baltimore & Ohio, at Baltimore, Md., died in that city on August 15, of heart disease. He was born at Albany, N. Y., on April 9, 1845, and began railway work in December, 1876. He was general advertising agent of the Atchison, Topeka & Santa Fe previous to 1878, and then for two years was confidential clerk to the general manager of the same road. From May, 1880, for one year he was chief clerk in the advertising department of the Baltimore & Ohio, and has been in the continuous service of that road ever since. In May, 1881, he was appointed assistant to the general passenger agent; one year later he was promoted to assistant general passenger agent. At the time of his death he was a member of the Safety Committee. At the time of the Chicago fair in 1893, he was chairman of the World's Transportation Commission, endowed by the late Marshall Field to study transportation history. In connection with this work he went to Europe, Asia and Africa to gather data for a history of transportation from the earliest times, and some of the results of his researches were embodied in a book entitled "The World's Railway."

Equipment and Supplies

LOCOMOTIVE BUILDING

THE ATLANTA & WEST POINT is in the market for one locomotive.

THE STEWART SUGAR COMPANY, Stewart, Cuba, has ordered one Mogul type locomotive from the Baldwin Locomotive Works.

THE CINCINNATI, HAMILTON & DAYTON has ordered 30 Mikado and 5 Pacific type locomotives from the Lima Locomotive Corporation.

THE CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS reported in the *Railway Age Gazette* of August 14 as being in the market for a number of switching locomotives, is in the market for 11 locomotives of that type.

THE SAN DIEGO & ARIZONA has ordered one Consolidation freight locomotive from the American Locomotive Company. This locomotive will have 22 by 30 in. cylinders, 57 in. driving wheels, a total weight in working order of 212,000 lb., and a steam pressure of 200 lb. This is in addition to a similar order reported in the *Railway Age Gazette* of August 7.

CAR BUILDING

THE CHESAPEAKE & OHIO is in the market for 350 freight cars.

THE LEHIGH & HUDSON is in the market for twenty 50-ton ore cars.

THE SOUTHERN PACIFIC has again opened negotiations and is now inquiring for 2,600 box cars.

IRON AND STEEL

THE CHICAGO & ILLINOIS WESTERN has ordered 238 tons of steel consisting of girders, I-beams and columns from the Chicago Bridge & Iron Company, Chicago.

THE CHICAGO, MILWAUKEE & ST. PAUL has ordered 128 tons of material for a subway at Winnebago avenue, Chicago, from the Wisconsin Bridge & Iron Company, Chicago.

ROUMANIAN RAILWAY EXTENSIONS.—The Roumanian Legislative Assembly recently unanimously voted a credit of about $100,000,000 intended for the development of the railways of the country. Among the most interesting of the new lines proposed is the construction of a line to connect Bucharest directly with Belgrade.

FALLING OFF IN ARGENTINE RAILWAY RECEIPTS.—The most important Argentine railways render accounts for the fiscal year from July 1 to June 30. With the exception of three companies gross receipts for 1913-14 show an important falling off as compared with those of the preceding year. This is attributed in the first place to disastrous droughts, which resulted in greatly diminished wheat and linseed crops, and in the second place to the general business depression. The Buenos Aires Great Southern shows a falling off in gross receipts from $31,334,970 in 1912-13 to $26,084,440 in 1913-14. Decrease in gross receipts in 1913-14, as compared with 1912-13, was as follows on the different lines: Buenos Aires Great Southern, $5,250,530; Buenos Aires & Pacific, $3,372,484; Buenos Aires Western, $2,082,862; Central Argentine, $2,068,112; Midland, $104,138; Northeastern Argentine, $95,432; Rosario to Puerto Belgrano, $142,029; Provincial of Santa Fe, $550,706; Compañia General de Buenos Aires, $1,034,451. Gross receipts of three railways showed the following gains in 1913-14 as compared with 1912-13: Entre Rios Railway, $65,698; Central Cordoba, $344,553; Buenos Aires Central, $106,537. The government railways, which render accounts for the calendar year, show the following falling off in gross receipts for the first six months of 1914 as compared with corresponding period of 1913: Central Northern & Chaco branches, $536,009; Northern Argentine, $138,834; Northern Argentine (Cordoba division) and Northwestern, $7,953.

Supply Trade News

The patent granted William R. McKeen covering all-steel box cars, as mentioned in the July 10 issue, on page 80, should have been numbered 1,107,086, instead of the number mentioned, which was the serial number.

George Blackmore, eastern sales manager of the Union Switch & Signal Company, has been elected vice-president and director of the Bryant Zinc Company, Chicago, with headquarters at New York, effective September 1.

Edmund Quincy, Lehigh 1913, for the past year with the Pennsylvania Steel Company, Steelton, Pa., will become connected with the engineering department of the Q & C Company, New York, effective September 1.

Willard Doud, formerly shop engineer of the Illinois Central and Chicago, Burlington & Quincy, having completed the special engineering work involved in the construction of the new shops for the Belt Railway of Chicago, at Chicago, announces the opening of offices in the Morton building, 538 South Dearborn street, Chicago, for the handling of all matters pertaining to the design, construction, equipment and operation of railroad and industrial shops and power plants.

There have recently been put in service three Waddell & Harrington type vertical lift bridges, with unusually long spans. Of these, the one over the Missouri river at Mondak, Mont., for the Great Northern is 296 ft. long, the longest of this type ever built. The second longest is the one over the south branch of the Chicago river in Chicago, for the Pennsylvania, which is 272 ft. 10 in. long. The third bridge, which measures 271 ft. from center to center of pins, is over the Yellowstone river on the Great Northern.

Thomas A. Griffin, chairman of the board of directors of the Griffin Wheel Company, Chicago, died on the steamship Korea on the way from Yokohama to Honolulu on August 12. Mr. Griffin was born August 28, 1852, at Rochester, N. Y. His first business experience was as an apprentice at Rochester, and since 1868 he had been continuously in the car wheel manufacturing business. In 1875 he went to Detroit and operated for the Michigan Car Company its plant known as the Detroit Car Wheel Company. In 1879 the Griffin Car Wheel Company of Detroit was organized, and the following year Mr. Griffin went to Chicago, where he organized the Griffin & Wells Foundry Company, which was merged into the Griffin Wheel & Foundry Company in 1886. Mr. Griffin at this time acquired all of the interest in the Griffin Car Wheel Company at Detroit, and subsequently the name of this company was changed to the Griffin Wheel Company. Besides having five foundries in Chicago the company operates foundries in Boston, St. Paul, Detroit, Kansas City, Denver, Tacoma and Los Angeles.

T. A. Griffin

TRADE PUBLICATIONS

BRIDGE AND PIER LAMPS.—Bulletin No. 16 of the Armspear Manufacturing Company, New York, contains eight pages devoted to illustrations of its spheroidal lens bridge and pier lamps. These lamps are built to conform to the latest specifications of the Bureau of Lighthouses.

Railway Construction

ATLANTIC, WAYCROSS & NORTHERN.—Grading work is now under way, it is said, on an extension from Kingsland, Ga., west to Folkston, 22 miles. The company now operates 11 miles of railroad from St. Mary's west to Kingsland. (February 20, p. 407.)

BIRMINGHAM, SELMA & MOBILE.—An officer writes that as soon as bonds are sold contracts will be let to build a line connecting Blockton, Ala., Marion and Selma, to have a total length of 67 miles. Track has been laid on 12 miles. The maximum grades will be 1.5 per cent, and maximum curvature 4 deg. There will be one 200-ft. steel bridge and 38 trestles. The company expects to develop a traffic in lumber, logs, cotton, grain, fertilizer, cattle and coal. J. F. Johnston, president, Brent, Ala.

CARTHAGE & COPENHAGEN.—Plans are being made, it is said, to build the extension projected in 1912 from Copenhagen, N. Y., south to a connection with the Lehigh Valley at Camden, about 35 miles. The company now operates 9 miles of railroad from Carthage southwest to Copenhagen.

CHATTAHOOCHE VALLEY.—This company, which now operates a 34-mile line from Standing Rock, Ala., south via West Point, Ga., to Jester, Ala., is making surveys, it is said, to build a 15-mile extension. The projected route is from McCulloh to a connection with an existing line to Columbus.

CINCINNATI, NEW ORLEANS & TEXAS PACIFIC.—An officer writes that a contract has been given to Dunn & McCarthy, Chicago, for building 8.9 miles of second track between tunnel 15, just south of New River, Tenn., and tunnel 16, just north of Sunbright. The work will consist of the construction of parallel track on present grade.

DOMINION ATLANTIC.—Work is now under way on the North Mountain branch from Centerville, N. S., on the Cornwallis Valley branch, to Weston 14.79 miles. It is expected that the branch will be opened for operation in 1915. A contract to build the line was given last year to Kirk & Cooke, North Sidney. (December 12, p. 1147.)

HAMLIN & GUYANDOTTE.—This company has been incorporated in West Virginia with $50,000 capital and office at Hamlin. The plans call for building from a point at or near Hamlin to a point on the Guyandotte river near West Hamlin, in Lincoln county. The incorporators include L. R. Sweetland, J. S. Pridemore, L. M. Thacker and A. F. Morris of Hamlin. J. W. Dingess, of Huntington, and George E. McComas of Milton.

ILLINOIS CENTRAL.—This company has awarded a contract for the extension of its freight yards at Fulton, Ky., to H. W. Nelson, Fulton, Ky. The improvement consists of the extension of the old tracks a distance sufficient to accommodate 80 additional cars and the building of a few new tracks. This will require grading to an extent of 80,000 to 90,000 cu. yd. The estimated cost is $75,000.

KANSAS CITY, KAW VALLEY & WESTERN (Electric).—This company will start work soon, it is said, on the extension from Bonner Springs, Kan., west to Lawrence. The company started work in 1913, on a line from Kansas City west via Bonner Springs to Lawrence, about 40 miles, and in June of this year opened for operation the first section from Kansas City to Bonner Springs, 17 miles.

MISSOURI, ARKANSAS & SOUTHWESTERN.—Under this name, a line is to be built, it is said, from Mena, Ark., east to Hot Springs, about 80 miles. The Century Construction Company is the contractor and promoter. G. D. Thayer is president of the construction company and general manager of the railway company. B. W. Bartholomew is chief engineer, Mena.

MONONGAHELA SOUTHERN TRACTION.—Incorporated in Pennsylvania with a $108,000 capital to build from California, Pa., south to Brownsville, about five miles. C. L. Snowden, president, Brownsville; J. P. McKelvey, Pittsburgh; C. H. Story and F. B. Snowden, Brownsville, and L. V. Phillips, Uniontown, are directors.

NEW YORK SUBWAYS.—The New York Public Service Commission, First district, has executed a contract with the Rapid Transit Subway Construction Company for the construction of section 1-A, of Routes Nos. 4 and 38, the Seventh avenue subway in the borough of Manhattan. This section covers the connection between the new Seventh avenue subway and the existing subway at the Battery. The contract price is $474,244. The commission also, executed a contract with the Station Construction Company, Inc., for station finish on certain stations on the extension of the Fourth avenue subway from Forty-third to Eighty-sixth streets, borough of Brooklyn. The contract price is $251,134.

NORTHERN PACIFIC.—This company has awarded to the Cook Construction Company a contract for grading a branch line from Beach, N. D., southerly a distance of 26 miles.

READING, BIRDSBORO & POTTSTOWN (Electric).—An officer writes that this company expects to let contracts in about 60 days to build from Reading, Pa., southeast via Birdsboro, Berks county, to Pottstown, about 25 miles. W. Abbott Whitman, Sr., president. A. H. Leader, engineer, Reading. (May 22, p. 1171.)

SEATTLE, PORT ANGELES & LAKE CRESCENT.—We are told that the Erickson Construction Company, Seattle, Wash., is now at work building about 27 miles west of Port Angeles and 37 miles east, connecting at Fairmount, Wash., with the Port Townsend & Puget Sound. The company will not build a street car line at Port Townsend, nor any extension along Hood canal to Olympia. It is expected that the line will be completed this year between Port Townsend and Port Angeles, 50 miles. It will probably be eventually extended further west into the heavy timber section of Clallam and Jefferson counties. C. J. Erickson, president, Seattle. (July 24, p. 190.)

SHELBY NORTHERN.—This company expects to begin work in October, it is said, on a line from Shelby, N. C., north to Casar, about 20 miles. C. R. Poole, Rockingham, N. C., may be addressed.

SOUTH CAROLINA ROADS.—We are told that a preliminary survey has been made and most of the right of way has been secured for an 18-mile line to be built from a connection with the Carolina, Atlantic & Western at Hartsville, S. C., northeast to a connection with the Atlantic Coast Line at Society Hill. The promoters are not ready to let contracts for the construction work, as a charter has not yet been secured. Steam is to be used as the motive power for freight service and the question of using both gasolene and electric storage battery cars for passenger traffic, is under consideration. The principal commodities to be carried include fertilizer, cotton, cotton seed, tobacco, grain, fruit, agricultural products and coal. C. D. O'Neal, Wilmington, N. C., may be addressed.

SOUTHERN RAILWAY.—An officer writes that a contract has been given to W. W. Boxley & Co., Roanoke, Va., for building seven miles of second track on the Washington division between Charlottesville, Va., and Arrow Head. The work involves a slight revision of grade.

TEXAS ROADS.—M. J. Healey, Big Springs, Tex., and associates, who are promoting the construction of a railroad from Big Springs, Tex., northwest to Texico, N. Mex., about 175 miles, expect to place surveyors in the field to locate the route about September 1. Land and money bonuses in aid of the project have been raised in the different towns along the route. Residents of Big Springs have agreed to contribute $30,000 and 25 acres of land in return for which the general offices and shops are to be located at that place. The line will connect with the Texas & Pacific at Big Springs, and with the Santa Fe at Lamesa and at Texico.

TOLEDO, OTTAWA BEACH & NORTHERN (Electric).—An officer writes that this company now operates a line from Toledo, Ohio, north to Toledo Beach, Mich., which is six miles south of Monroe. The company has been considering for some time the question of building an extension of about three miles from Toledo Beach north along the shore of Lake Erie, but will not extend the line to Monroe, as has been reported.

Wilmington & Carolina Beach (Electric).—Under this name a line is to be built, it is said, from Wilmington, N. C., via Sunset Park to Wilmington Beach, about 13 miles. In addition the company plans to build about 11 miles of city lines, and a power house. C. C. Chadbourn is president.

RAILWAY STRUCTURES

Birmingham, Ala.—A contract has been given to the Jefferson Construction Company, New Orleans, La., it is said, to build the viaduct over the tracks of the Louisville & Nashville and the Southern Railway on First avenue, in Birmingham. (May 8, p. 1055.)

Colmar, Pa.—The Philadelphia & Reading has applied to the Pennsylvania State Water Supply Commission for permission to build a bridge at Colmar.

Covallen, Pa.—The Pennsylvania Railroad has applied to the Pennsylvania State Water Supply Commission for permission to build a bridge at Covallen.

Elizabethtown, Pa.—An officer of the Pennsylvania Railroad writes that a contract was given recently to the Pitzel Construction Company, Lancaster, Pa., for improvements at Elizabethtown to cost about $54,000. The work includes the changing and building of the freight station and making other improvements. A new passenger station 27 ft. by 75 ft. of stone construction will be built on the north side of the track, about one-quarter mile east of where the present station is located. The main waiting room will be down on the street level and there will be baggageways leading up to the passenger tunnel underneath the tracks. All platforms will be of cement and there will be two enclosed shelter sheds of stone construction 64 ft. long.

Halifax, N. S.—On the Dominion Atlantic, which is controlled by the Canadian Pacific, improvements are being carried out in connection with the laying of larger rails, which include the substitution of concrete steel structures for all bridges and culverts. The new Bear river bridge over 1,425 ft. long is about completed. Work has recently been started on the Avon bridge at Windsor, to be 1,110 ft. long, and the Weymouth bridge over the Sissiboo river to be 1,100 ft. long. New bridges have been built also on the Midland division across the Shubenacadie river at Cambridge, at Moose river and at Allen's creek, and one is under construction at Gaspereau. Trestles have been filled in and sidings lengthened at various points, and new stations were built at Wolfville, at Patterson and at Mosherville.

Milwaukee Wis.—The Chicago & North Western has awarded a contract for a bridge on its main line over the Milwaukee river near Milwaukee, to the Cleary-White Construction Company, Chicago. This company has let a sub-contract for driving piles to Pellett & McMullen, Manitowoc, Wis.

Pennsylvania.—The Pennsylvania State Water Supply Commission has approved the applications of the following railroad companies to build bridges; Chartiers Southern, six bridges, over Little Chartiers creek and Daniel's run in Washington county; Pittsburgh, Chartiers & Youghiogheny, five bridges, in Washington county, and Pennsylvania Railroad, two bridges, in Crawford county.

Scranton, Pa.—An ordinance has been passed by the city of Scranton, it is said, granting permission to the Delaware, Lackawanna & Western to carry out improvements, including the elimination of grade crossings at McHale's court, West Scranton and at Court street, North Scranton. It is understood that the company will at once carry out this work, also the elimination of the grade crossing at Myrtle street. In addition plans have been made to eliminate the grade crossing at Theodore street, North Scranton.

The Street Car Lines of the Argentine Republic.—There were 666 miles of electric tramways in Argentina in 1913, 476 of which were located in the city of Buenos Aires, and the remainder in various provincial cities. Passengers carried by the Buenos Aires lines in 1913 numbered 423,661,587, an increase in round numbers of 31,000,000 over 1912.

Railway Financial News

Atlanta, Birmingham & Atlantic Railway Company.—This is the name of the new company organized as successor to the Atlanta, Birmingham & Atlantic Railroad Company; and at a meeting of the directors in Atlanta, August 15, E. T. Lamb, receiver in charge of the property and general manager for the past year, was chosen president of the new corporation. Brooks Morgan, of Atlanta, was chosen vice-president. All of the officers of the operating, traffic and accounting departments were continued in their present places. F. K. Mays is both secretary and treasurer. The court is expected to terminate the receivership within a few days. Application for the approval of bonds to be issued by the new company is now pending before the Georgia State Railroad Commission.

Canadian Pacific.—A special meeting of the stockholders is called for October 7, the day of the regular annual meeting, to vote on a proposal to increase the capital stock of the company by the sum of $75,000,000. This will increase the outstanding amount from $260,000,000 to $335,000,000, or the full amount authorized. In a statement dealing with the company's financial position President Shaughnessy says that no new works of any magnitude are contemplated at present, and therefore no necessity exists for a further issue of capital stock, but that this proposal is to provide for the company's future capital requirements as they arise. The last financing of the company was in December, when $52,000,000 of 6 per cent notes were issued.

New York, New Haven & Hartford.—The suit of certain stockholders entered in the Massachusetts Supreme Court July 17, demanding that the company, and the men who were its directors from 1904 to 1911, refund sums alleged to have been wasted by mismanagement, came up before Justice Braley at Boston, August 18, and an injunction was issued restraining the directors named in the suit from transferring stock of the company held by them pending a decision by the full bench of the court, which has under consideration the application for the appointment of a receiver in this suit.

Pere Marquette.—The committee formed last April to protect holders of equipment obligations has agreed with the receivers, to deposit $57,833 on the first of each month during the current fiscal year for payment of principal and interest on equipment obligations. In addition to these contributions by the committee the receivers purpose to apply $65,000 a month to the repair of cars. J. P. Morgan & Co. and the Guaranty Trust Company have acquired approximately $1,700,000 of the equipment obligations, and, under arrangements with the receivers, have taken a like amount of receivers' certificates in exchange.

San Antonio, Uvalde & Gulf.—On application of a majority of the stockholders of this company the United States District Court for the district of Texas, on August 12, appointed Duval West, of San Antonio, receiver for the property of the company and also for the Medina Irrigation Company. This railroad extends from San Antonio, Tex., southeastward to Corpus Christi, and westward to Uvalde and Crystal City. The total length of lines operated is 314 miles. The amount of stock outstanding is $230,000; and the bonds amount to $3,663,000. The Bankers' Trust Company of St. Louis is the trustee. The president and general manager of the road is A. R. Ponder, San Antonio.

Railway Extension in India.—The government of India has given its consent to the construction, by the Mysore Durbar, of a line of meter gage railway from Mysore to Arsikere via Hassan, a distance of 107 miles.

New Chinese Railways Contract.—At Peking, on July 26, a representative of an English firm signed the final contract to finance and construct a railway from a point opposite Shasi in the Yangtze Valley to Shiung-yi-fu in Kwei-Chou, with a branch line from Cheng-te-fu to Changsha, the capital of Hunan.